



Workshop Manual

Audi A6 2011 >
Audi A6 China 2012 >
Audi A7 Sportback 2011 >

6-cylinder direct injection engine with supercharger
(3.0 ltr. 4-valve TFSI)

Engine ID	CGW B	CGX B	CHM A	CGW D	CTTA	CTU A			
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List of Workshop Manual Repair Groups

Repair Group

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- 15 - Cylinder head, valve gear
- 17 - Lubrication
- 19 - Cooling
- 21 - Turbocharging/supercharging
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- 26 - Exhaust system
- 28 - Ignition system



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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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00 – Technical data

1 Identification

(ARL005949; Edition 08.2018)

⇒ ["1.1 Engine number/engine data", page 1](#)

1.1 Engine number/engine data

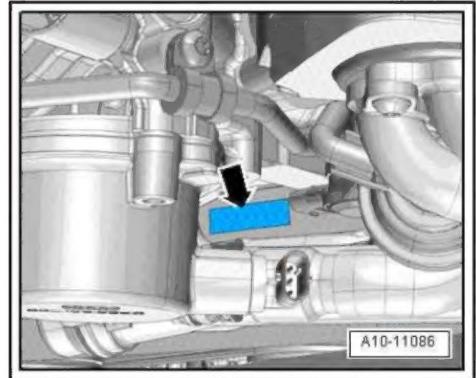
Engine number



Note

Pull off engine cover panel (front) to make the engine number visible.

- ◆ The engine number ("engine code" and "serial number") can be found on the front of the cylinder block beneath the cylinder head (right-side) -arrow-.
- ◆ Engine codes starting with the letter "C" have four letters (previously three letters).
- ◆ The first 3 characters of the engine code stand for the engine capacity and the mechanical construction and design. They are stamped onto the cylinder block together with the serial number.
- ◆ The 4th character indicates the power output and torque of the engine and is determined by the engine control unit.



Note

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- ◆ *The four-letter engine code is found on the type plate (certain countries only), vehicle data sticker and engine control unit.*
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- ◆ *Fitting locations of the type plate (certain countries only) and the vehicle data sticker ⇒ Maintenance ; Booklet 411 .*

For engine data refer to ⇒ Technical data for engines; Rep. gr. 00 ; Overview of engines .



2 Safety precautions

⇒ "2.1 Safety precautions when working on the fuel supply system", page 2

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⇒ "2.2 Safety precautions when working on vehicles with start/stop system", page 2

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⇒ "2.3 Safety precautions when using testers and measuring instruments during a road test", page 2

⇒ "2.4 Safety precautions when working on the subframe", page 3

⇒ "2.5 Safety precautions when working on the cooling system", page 3

⇒ "2.6 Safety precautions when working on the ignition system", page 3

⇒ "2.7 Safety precautions when working on the exhaust system", page 4

2.1 Safety precautions when working on the fuel supply system

Risk of injury - fuel system operates under high pressure

The fuel system is pressurised. There is a risk of injury as fuel may spray out.

Before opening the fuel system:

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap a clean cloth around connection and open connection carefully).

Risk of fire due to escaping fuel

If the battery is connected, the door contact switch activates the fuel pump when the driver's door is opened. Escaping fuel may ignite, causing a fire.

- Before opening the fuel system, disconnect power supply to fuel pump.

2.2 Safety precautions when working on vehicles with start/stop system

Risk of injury - engine may start unexpectedly

The engine can start unexpectedly if the vehicle's start/stop system is activated. A message in the instrument cluster indicates whether the start/stop system is activated.

- To deactivate the start/stop system, switch off the ignition.

2.3 Safety precautions when using testers and measuring instruments during a road test

Risk of injury if test equipment is not secured

If an accident occurs and the front passenger's airbag is triggered, test equipment which is not secured adequately may be catapulted through the vehicle with potentially serious consequences.

- Secure test equipment on the rear seat with a strap.

Or:

- Have a second mechanic operate test equipment on the rear seat.

2.4 Safety precautions when working on the subframe

When working on the subframe note the following warnings:



Caution

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- ◆ *The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.*
- ◆ *The vehicle must NOT be supported by applying a trolley jack or similar to the subframe or subframe cross brace.*

2.5 Safety precautions when working on the cooling system

Risk of scalding as hot coolant can escape

The cooling system is under pressure when the engine is hot. Risk of scalding due to hot steam and hot coolant.

- Put on protective gloves.
- Put on safety goggles.
- Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



Caution

Overheating can occur if the filler cap is not fitted properly.

- ◆ *The filler cap must engage positively and audibly when it is closed.*

2.6 Safety precautions when working on the ignition system

Risk of injury due to electric shock

When the engine is running, there are high voltage levels in the ignition system. There is a risk of electric shock when touching the ignition system!

- Never touch or disconnect ignition wiring when the engine is running or being turned at cranking speed.

Risk of damage to components

Washing the engine or connecting/disconnecting electrical wiring may result in components being damaged if the engine is running.

- Switch off ignition before connecting/disconnecting electrical wiring.
- Switch off ignition before cleaning engine.

2.7 Safety precautions when working on the exhaust system

Risk of damage to flexible joint

The flexible joint can be damaged or develop leaks if it is handled incorrectly.

- Do not bend flexible joint more than 10°.
- Install flexible joint so that it is not under tension.



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3 Repair instructions

⇒ "3.1 Rules for cleanliness", page 5

⇒ "3.2 Foreign particles in engine", page 5

⇒ "3.3 Contact corrosion", page 5

⇒ "3.4 Routing and attachment of pipes, hoses and wiring", page 6

⇒ "3.5 Installing radiators and condensers", page 6

3.1 Rules for cleanliness

Even small quantities of dirt can lead to defects. For this reason, please observe the following rules when working on the fuel supply system, injection system and turbocharger:

- ◆ Clean connections and surrounding area thoroughly with engine cleaner or brake cleaner and dry cleaned area before loosening.
- ◆ Immediately seal open lines and connections with clean plugs, for example from engine bung set - VAS 6122- .
- ◆ After removal, place parts on a clean surface and cover them. Only use lint-free cloths.
- ◆ Carefully cover or seal open components if repairs cannot be carried out immediately.
- ◆ Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have been previously unpacked and stored away loose (e.g. in toolboxes, etc.).
- ◆ Do not work with compressed air when the system is open. If possible, do not move vehicle.
- ◆ Make sure that no fuel runs onto the fuel hoses. Should this occur, the fuel hoses must be cleaned again immediately.
- ◆ Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

3.2 Foreign particles in engine

- ◆ When performing assembly work on the engine, all open passages in the intake and exhaust systems must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-) to prevent foreign particles from entering the engine.
- ◆ In the event of mechanical damage to one of the cylinder banks, the intake and exhaust systems and combustion chambers of the opposite cylinder bank must always be examined for foreign particles to prevent further damage occurring later.

3.3 Contact corrosion

Contact corrosion can occur if unsuitable fasteners (bolts, nuts, washers etc.) are used.

For this reason, only fasteners with a special surface coating are fitted.

Additionally, all rubber and plastic parts and all adhesives are made of non-conductive materials.

Always install new parts if you are not sure whether used parts can be re-fitted ⇒ Electronic parts catalogue .

Please note:

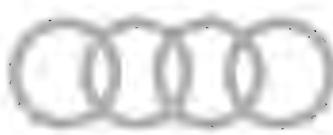
- ◆ We recommend using only genuine replacement parts; these have been tested and are compatible with aluminium.
- ◆ We recommend using Audi Genuine Accessories.
- ◆ Damage caused by contact corrosion is not covered by warranty.

3.4 Routing and attachment of pipes, hoses and wiring

- ◆ Mark fuel lines, hydraulic lines, vacuum lines, lines for activated charcoal filter and electrical wiring etc. before removal so they can be re-installed in the original positions and correctly connected. Make sketches or take photographs if necessary.
- ◆ To avoid damaging pipes, hoses and wiring, ensure sufficient clearance from all moving or hot components in engine compartment (limited space in engine compartment).

3.5 Installing radiators and condensers

Even when the radiator and condenser are correctly installed, slight impressions may be visible on the fins of these components. This does not mean that the components are damaged. If the fins are only very slightly distorted, this does not justify renewal of the radiator or the condenser.



10 – Removing and installing engine

1 Removing and installing engine

⇒ "1.1 Removing engine", page 7

⇒ "1.2 Separating engine and gearbox", page 36

⇒ "1.3 Securing engine to engine and gearbox support", page 47

⇒ "1.4 Installing engine", page 50

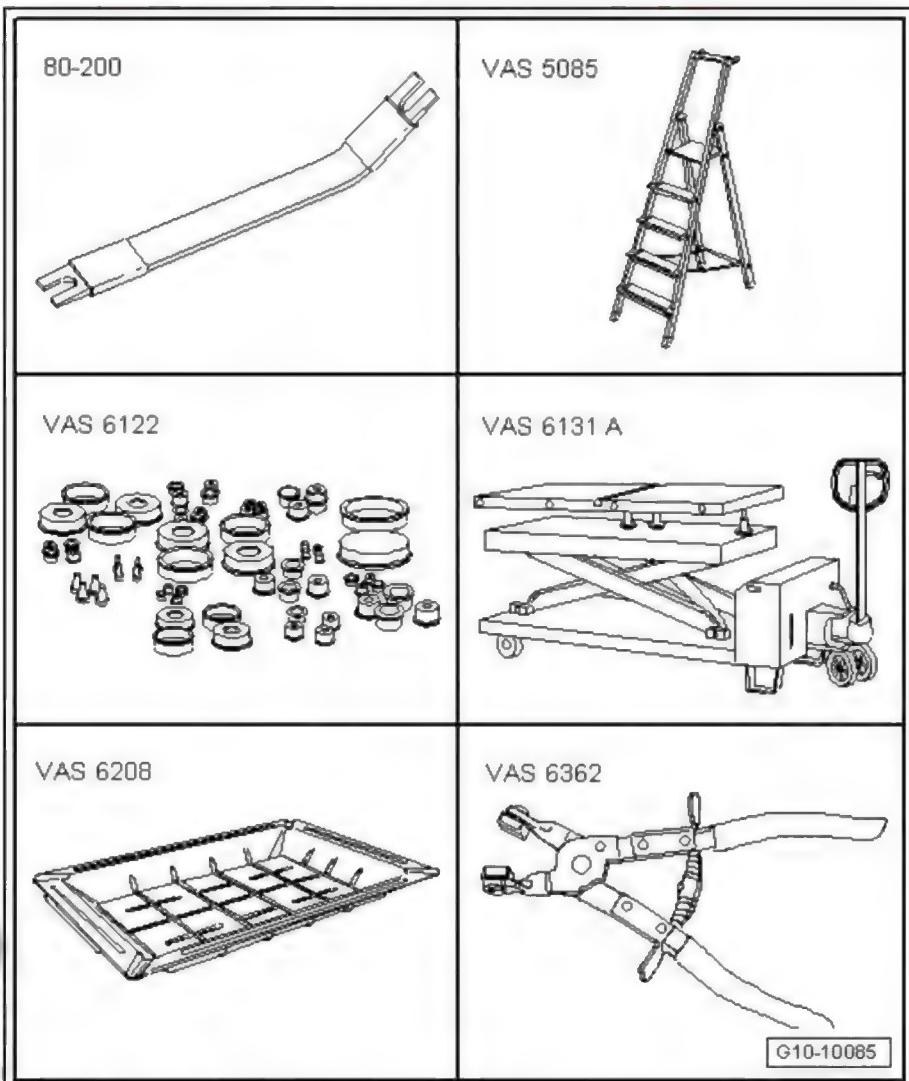
1.1 Removing engine

⇒ "1.1.1 Removing engine - vehicles with dual clutch gearbox", page 7

⇒ "1.1.2 Removing engine - vehicles with automatic gearbox", page 22

1.1.1 Removing engine - vehicles with dual clutch gearbox

Special tools and workshop equipment required

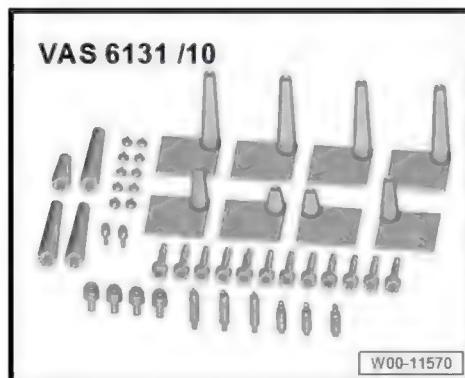


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◆ Removal lever 80-200 - see information in the document: Imported by AUDI AG.

- ◆ Stepladder - VAS 5085-
- ◆ Engine bung set - VAS 6122-
- ◆ Scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Hose clip pliers - VAS 6362-
- ◆ Support set for Audi - VAS 6131/10-



- ◆ Supplementary set -VAS 6131/11-
- ◆ Supplementary set, Audi Q7 >2005 - VAS 6131/13-



Procedure



Note

- ◆ *The engine is removed from underneath together with the gearbox and subframe (with lock carrier installed).*
- ◆ *Fit cable ties in the original positions when installing.*



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WARNING

Make sure the vehicle cannot tip over when the engine is removed.

- ◆ *Secure the vehicle, to do so, the luggage compartment must be empty.*

The fuel system operates at extremely high pressure. This can cause injury.

- ◆ *The fuel pressure in the high-pressure section of the injection system must be dissipated prior to opening the system.*

- Bring front wheels into straight-ahead position.



Note

The electromechanical parking brake must be released before disconnecting the battery so that the propshaft can be turned during removal.

- Switch off ignition and remove ignition key.
- Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
- Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a .
- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Remove propshaft ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .
- Pull engine cover panels -1- and -2- off upwards.



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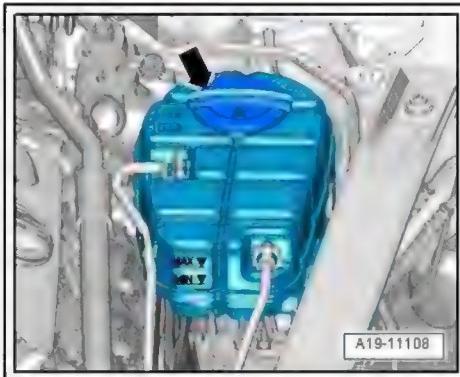


WARNING

The cooling system is under pressure when the engine is hot.
Risk of scalding due to hot steam and hot coolant.

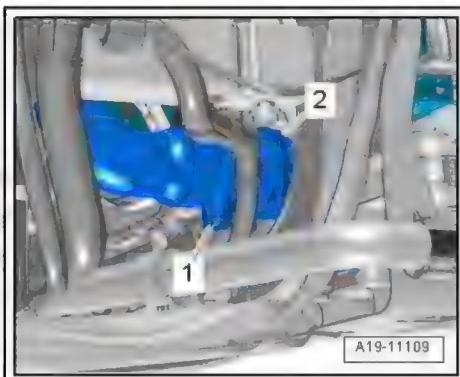
Danger of scalding skin and other parts of the body.

- Put on protective gloves.
- Put on safety goggles.
- Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



- Open filler cap -arrow- on coolant expansion tank.
- Remove both front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .
- Remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .
- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Remove drain plug -1- and drain off coolant.
- Lift retaining clip -2- and disconnect coolant hose from radiator.

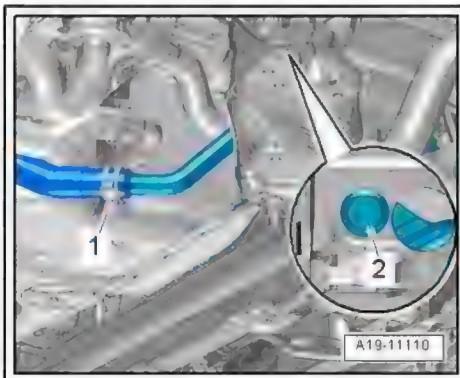
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- Release hose clip -1-, disconnect coolant hose from coolant pipe (bottom left) and drain off coolant.



Disregard -item 2-.



- Release hose clips -1- and -3-, disconnect coolant hoses from coolant pipes (front left) and drain off remaining coolant.

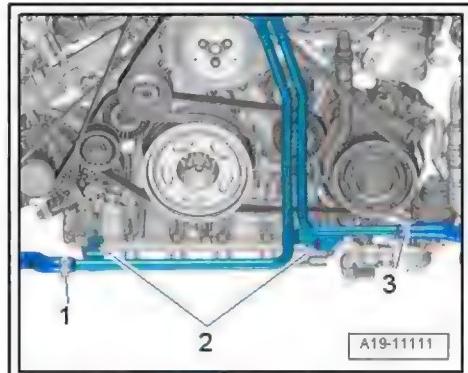


Note

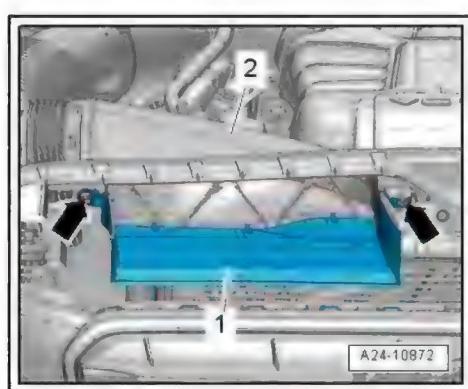
- ◆ *For illustration purposes, the installation position is shown with the engine removed.*
- ◆ *Disregard -item 2-.*

- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .

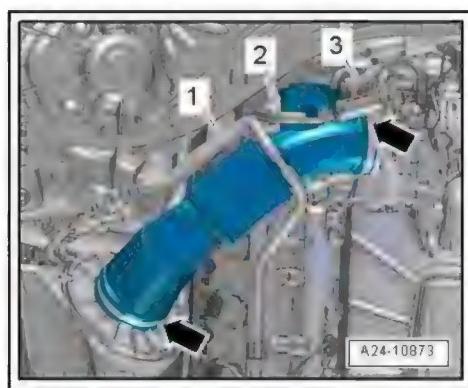
- Remove bolts -arrows- and detach air duct -1-.



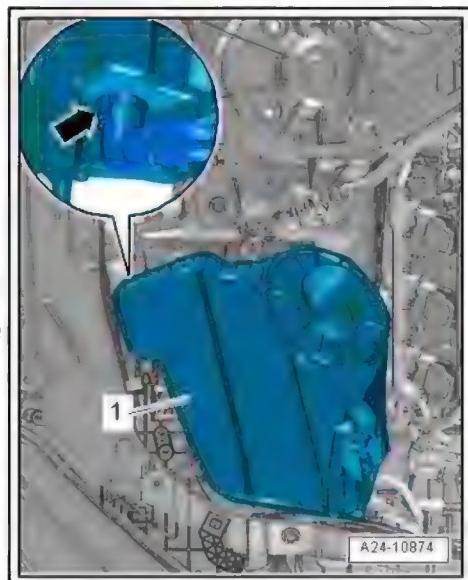
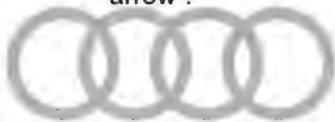
Disregard -item 2-.



- Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Loosen hose clips -arrows- and detach air pipe.



- Lift off air cleaner housing -1-.
- Press release tabs and disconnect secondary air hose -arrow-.



- Release hose clip -1- and disconnect vacuum hose from plenum chamber partition panel.
- Unplug electrical connector -2- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -3-.
- Detach activated charcoal filter solenoid valve 1 - N80- from bracket and move it clear to the side with hoses still attached.

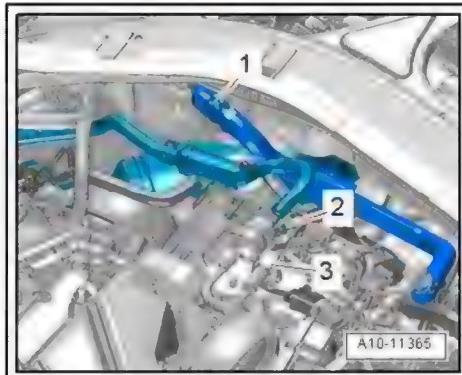


WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap a clean cloth around connection and open connection carefully).

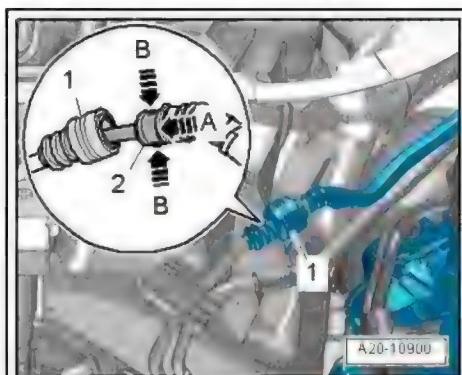


Caution

Take care to keep components clean.

- ◆ Observe rules for cleanliness when working on the fuel supply system [⇒ page 5](#).

- Disconnect fuel line -1- ⇒ Fuel supply system; Rep. gr. 20 ; Plug-in connectors; Disconnecting plug-in connectors .
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .

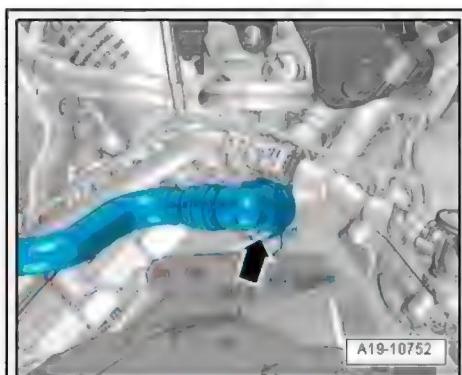


- Lift retaining clip -arrow- and detach coolant hose going to heat exchanger from rear of engine.

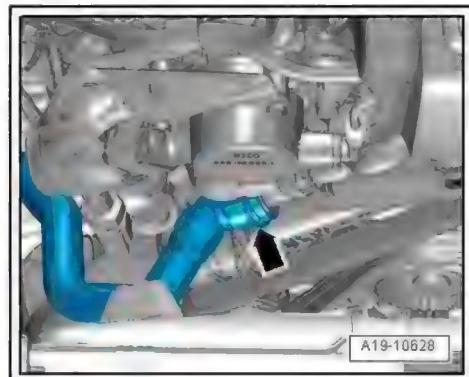


Note

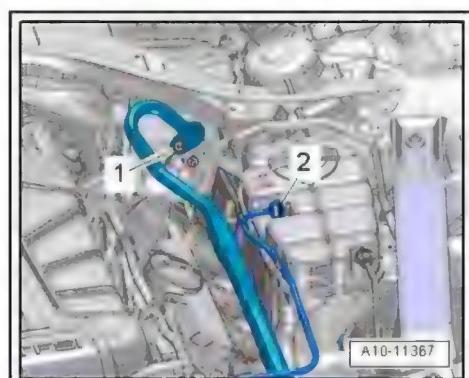
For illustration purposes, the installation position is shown with the engine removed.



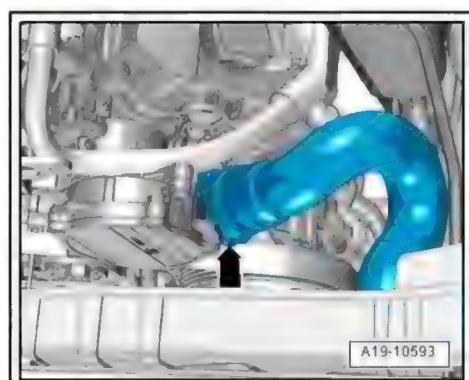
- Lift retaining clip -arrow- and detach coolant hose (front right) from coolant pipe (front).



- Lift retaining clip -2- and disconnect coolant line.
- Remove bolt -1- and move refrigerant line clear.



- Lift retaining clip -arrow-, detach coolant hose (left-side) from coolant pipe (front) and move coolant hose clear.

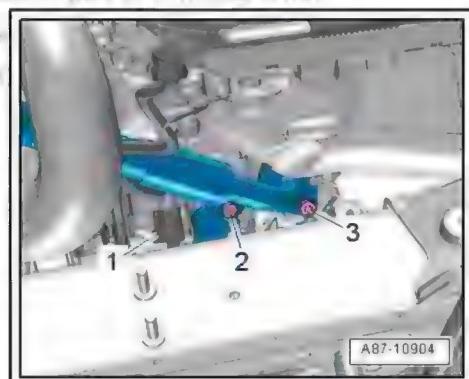


Caution

Risk of damage to refrigerant lines and hoses

- ◆ Do NOT stretch, kink or bend refrigerant lines and hoses.

- Unscrew bolt -2- and remove refrigerant line from air conditioner compressor.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .

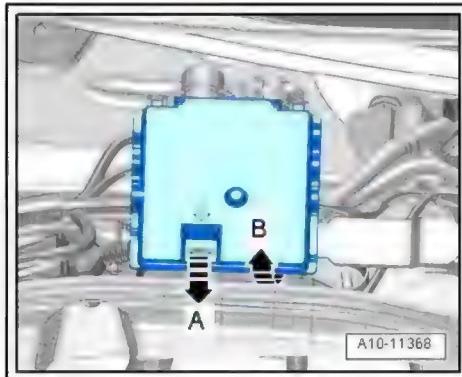


Note

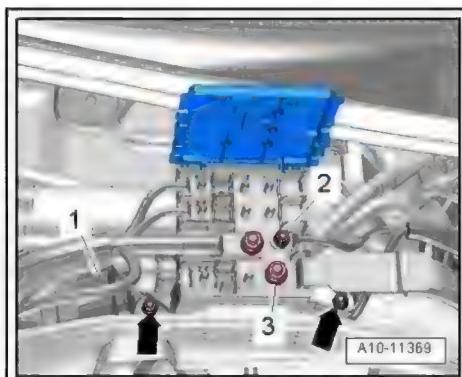
Disregard items -1 and 3-.

- Remove body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .

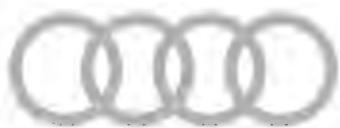
- Release retainer -arrow A- and open cover -arrow B-.



- Remove nuts -2 and 3- and move electrical wiring clear.
- Detach electrical connector -1- from bracket and unplug.
- Remove nuts -arrows- and detach terminal 30 wiring junction - TV2- from plenum chamber partition panel.



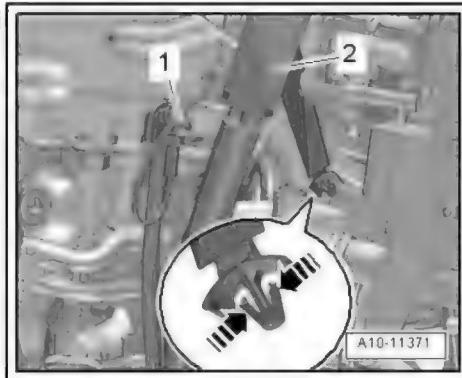
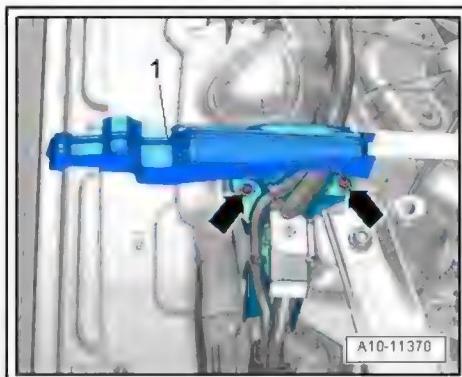
- Press foam wedge -1- to one side.
- Remove bolts -arrows-.



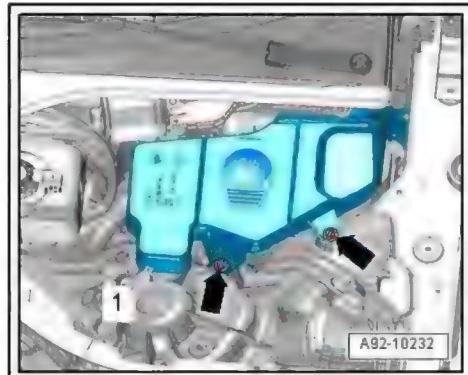
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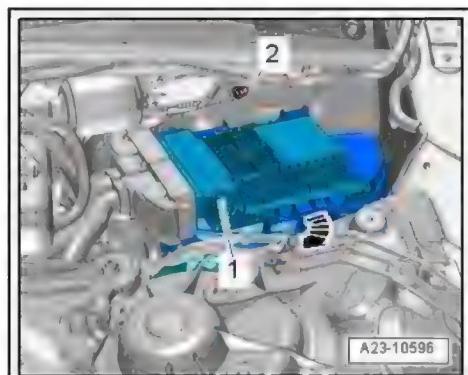
- Release fasteners -arrows- and move clear cable guide -2t..Copyright © Audi AG 2018
- Remove cap nut -1- and move earth wiring clear.



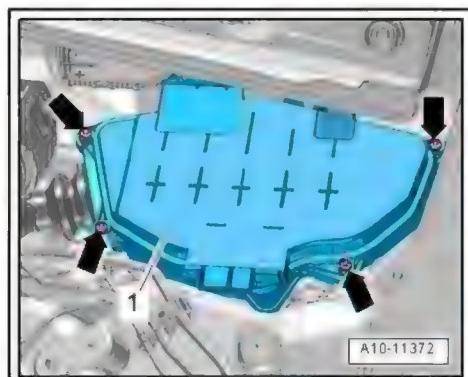
- Unscrew bolts -arrows- and pull filler neck -1- out of washer fluid reservoir and through opening in body to right side.



- Remove cap nut -2- and move earth wiring clear.
- Release fastener -arrow-, detach engine control unit - J623- -item 1- from bracket and swivel it to one side.

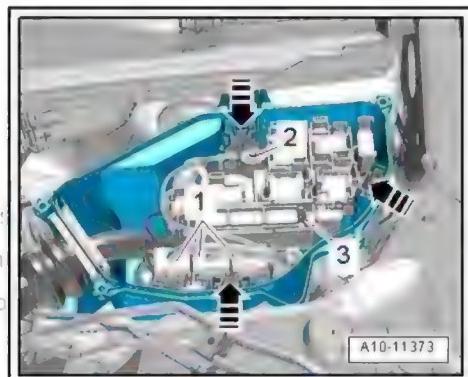


- Remove bolts -arrows- and detach cover -1- for electronics box in plenum chamber.



- Unplug electrical connectors -1- and unscrew nut -2- for electrical wiring.
- Release catches -arrows- and detach relay carrier with fuse holder -3-.
- Disengage engine wiring harness at electronics box in plenum chamber and move clear.

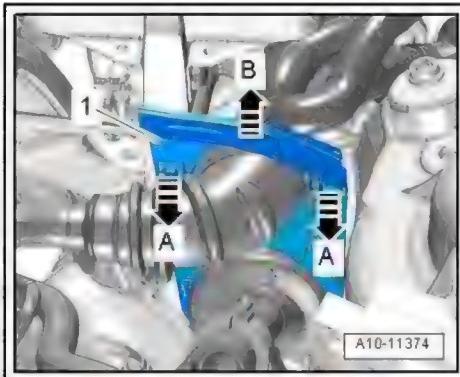
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- Release catches -arrows A- and lift off wiring protector -1- -arrow B-.
- Place wiring harness on engine and secure engine/motor control unit - J623- to prevent it from dropping.



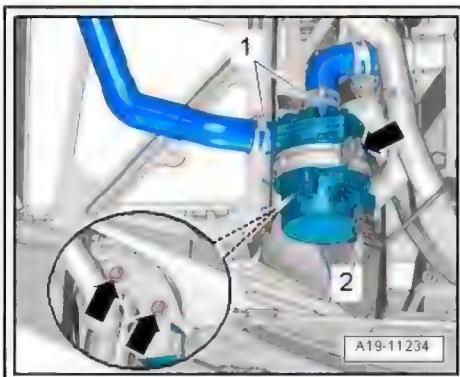
Photograph by copyright holder. Reproduced to enable an informed assessment to be made by Audi AG and its distributor. It must not be copied or distributed without the prior written consent of Audi AG. Any inspection to the correctness of information is the responsibility of the user.



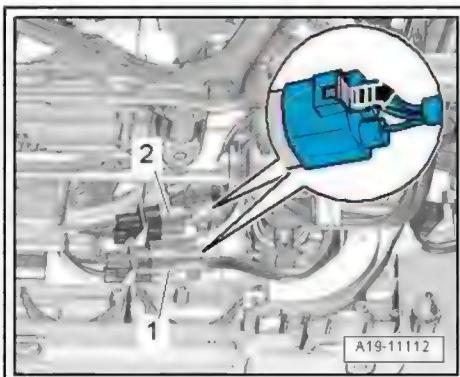
- Unplug electrical connector -2- from charge air cooling pump - V188- and move clear.



-Item 1- and -arrows- can be disregarded.



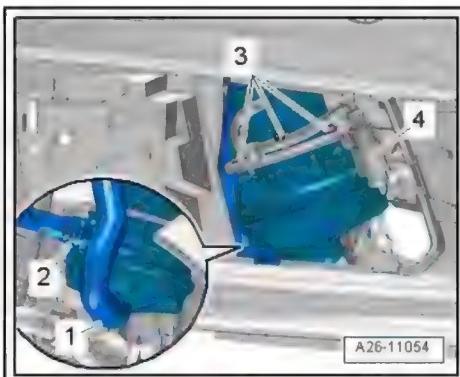
- Unplug electrical connectors -1- and -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).
- Move electrical wiring harness clear.



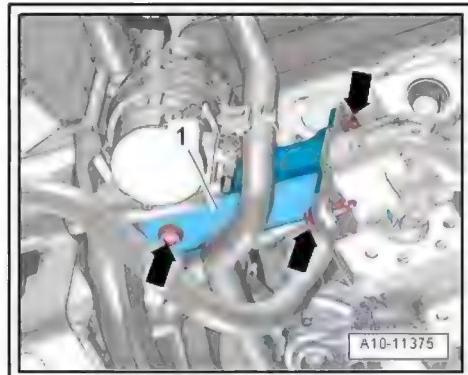
- Unplug electrical connector -4- at secondary air pump motor - V101- and move electrical wiring clear.
- Press release tabs, disconnect secondary air hose -2- and move hose clear.



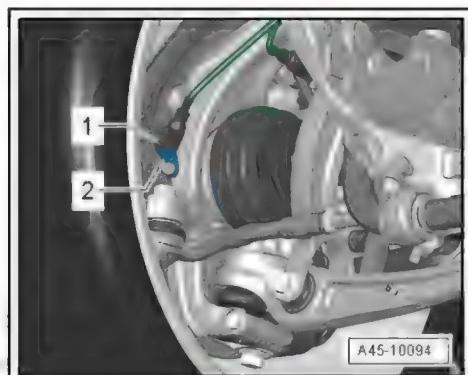
Disregard items -1 and 3-.



- Remove bolts -arrows- (left and right) and detach longitudinal member (bottom front) -1-.



- Unplug electrical connector -1- at front wheel speed sensor -2- -G45- / -G47- on both sides.



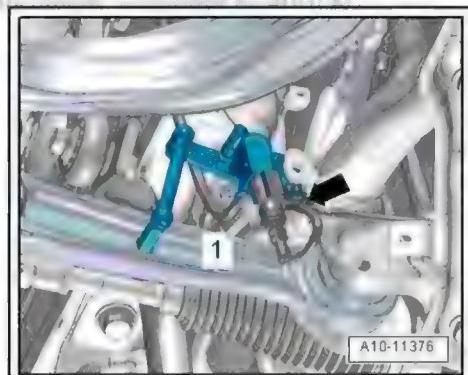
- If fitted, unplug electrical connector -1- at front vehicle level senders on both sides (-G78- and -G289-) and move electrical wiring clear -arrow-.
- Remove brake caliper and tie up in wheel housing with wire (brake hose remains attached) ⇒ Brake system; Rep. gr. 46 ; Front brakes; Removing and installing brake caliper .



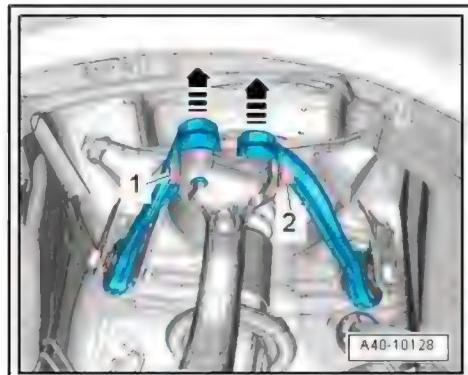
Caution

Risk of damage to brake pistons.

◆ *Do not press brake pedal with brake caliper removed.*



- Remove nut -2- and pull out bolt -1-.
- Pull upper suspension links upwards out of wheel bearing housing -arrows-.
- Repeat procedure on opposite side of vehicle.



- Remove bolt -1- for anti-roll bar on both sides.
- Remove nut -3- on both sides.



Note

The bolts -2- are removed at a later stage.

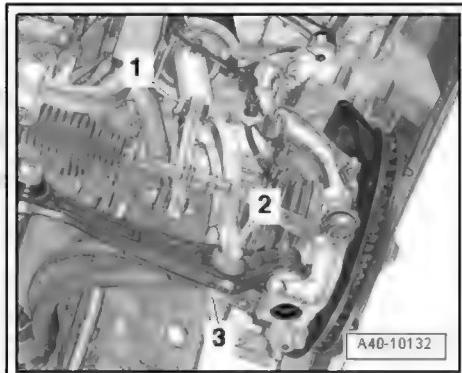
- Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing sub-frame cross brace .



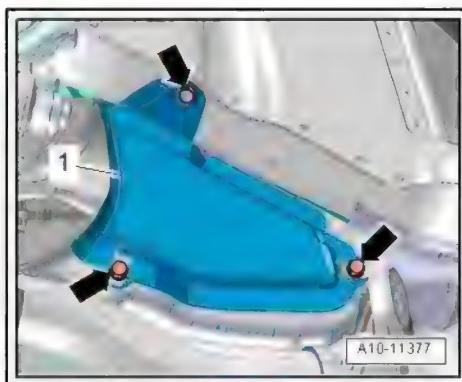
Caution

Risk of damage to running gear components.

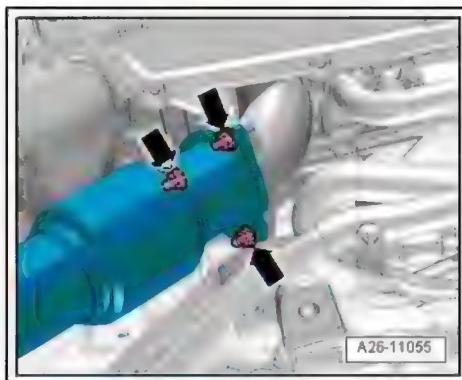
- ◆ The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.



- Remove bolts -arrows- on both sides and detach heat shield -1- on subframe.



- Unscrew nuts -arrows- and detach front silencer (left-side).



- Unscrew nuts -arrows- and detach front silencer (right-side).
- Detach intermediate steering shaft from steering rack and move clear by telescoping splines together ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .



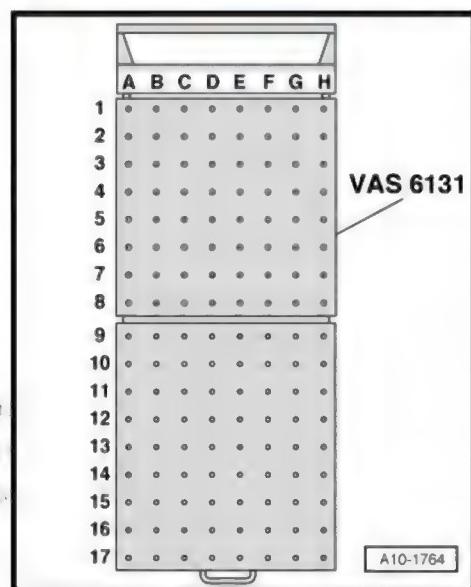
- Unplug electrical connector -2- at steering rack (release retainer -arrow- and press down release catch).
- Unplug electrical connector -1-.
- Move electrical wiring harness clear.



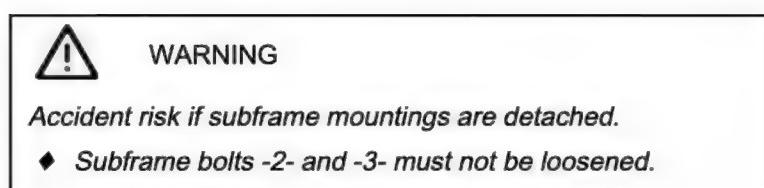
Set up the scissor-type assembly platform as follows:

- Set up scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13- as follows:

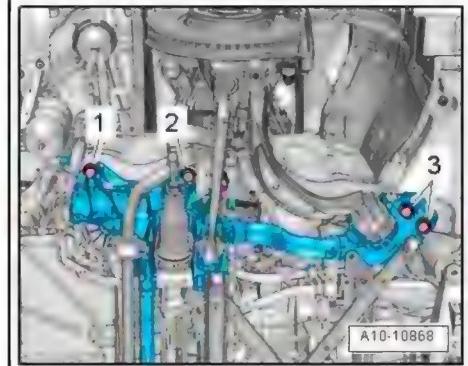
Platform coordinates	Parts of support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13-			
B4	/13-4	/10-4	/10-5	/13-1
G4	/13-4	/10-4	/10-5	/13-1
B6	/10-1	/10-2	/10-5	/10-11
G6	/10-1	/10-2	/10-5	/10-11
A8+C8	/13-6	-	-	/13-2
F8+H8	/13-5	-	-	/13-2
B14	/10-1	/10-3	/10-5	/11-1
G14	/10-1	/10-4	/10-5	/11-1



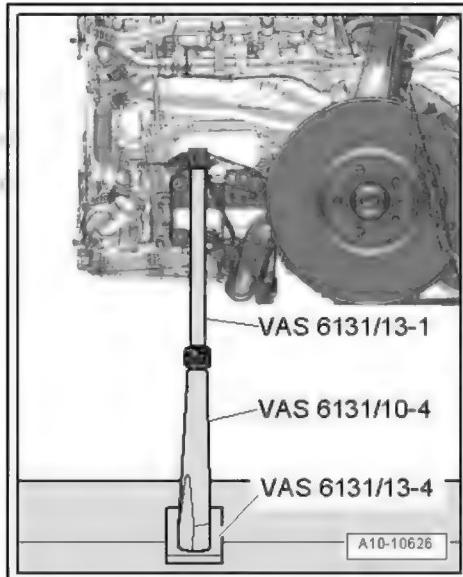
- Initially hand-tighten the support elements on the scissor-type assembly platform.
- Position scissor-type assembly platform - VAS 6131 B- horizontally.
 - Take note of spirit level (bubble gauge).
 - Position scissor-type assembly platform - VAS 6131 B- below engine/gearbox assembly.



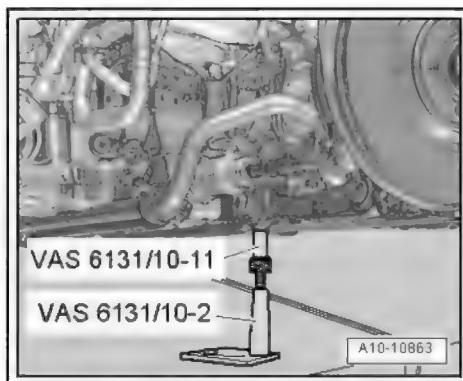
- Remove subframe bolts -1- on both sides.



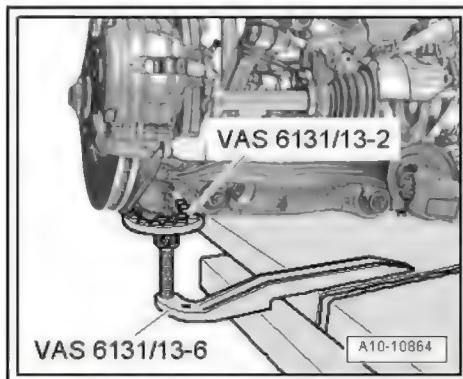
- Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.
- Make sure that threaded spindles are screwed in completely.



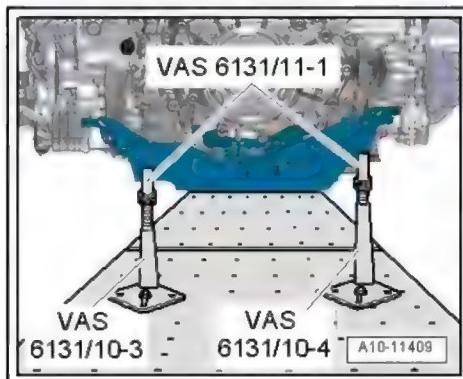
- Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.



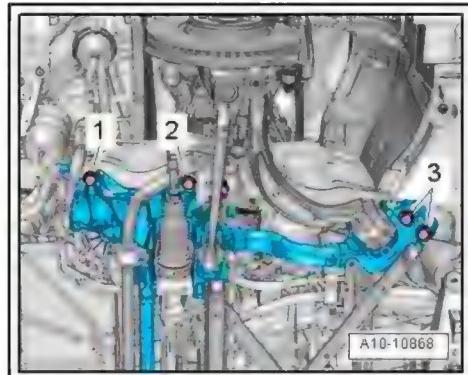
- Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.



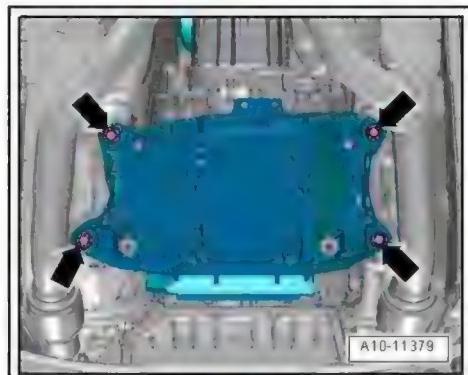
- Position support elements from -VAS 6131/10- and -VAS 6131/11- (rear left and right) at tunnel cross member as shown.
- Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
- Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 B- .



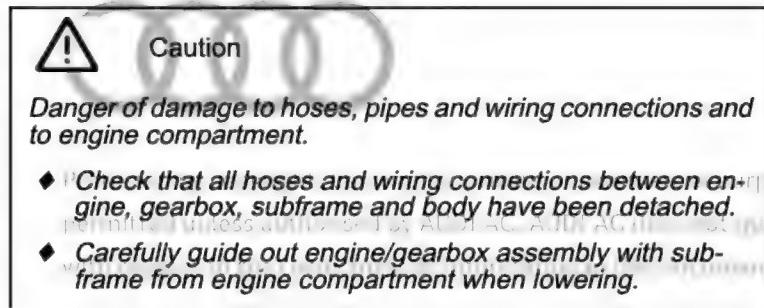
- Mark installation position of subframe and tunnel cross member on longitudinal members with felt-tip pen.
- Unscrew subframe bolts -2- and -3- on both sides in several stages and in diagonal sequence.



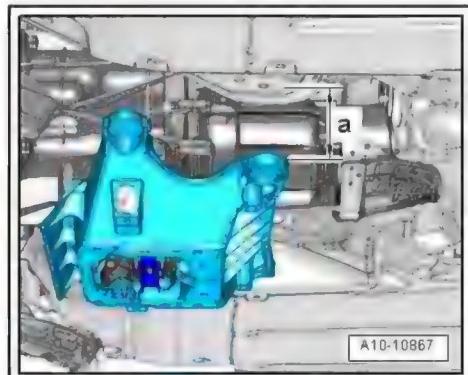
- Remove bolts -arrows- on tunnel cross member.



- Remove bolt -2- on both sides.



- Lower engine/gearbox assembly using scissor-type assembly platform - VAS 6131 B- initially only as far as distance -a-.
- Dimension -a- = 100 mm (maximum).

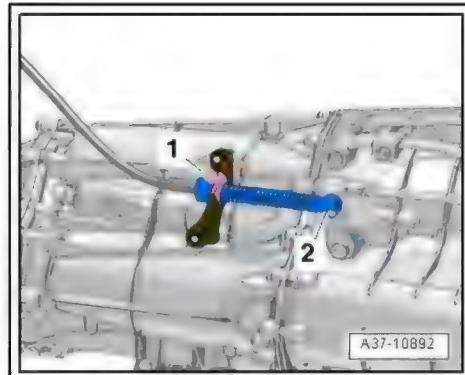


- Pry ball socket -2- of selector lever cable off gearbox selector lever using removal lever - 80 - 200- .
- Press off securing clip -1- and remove selector lever cable from gearbox.



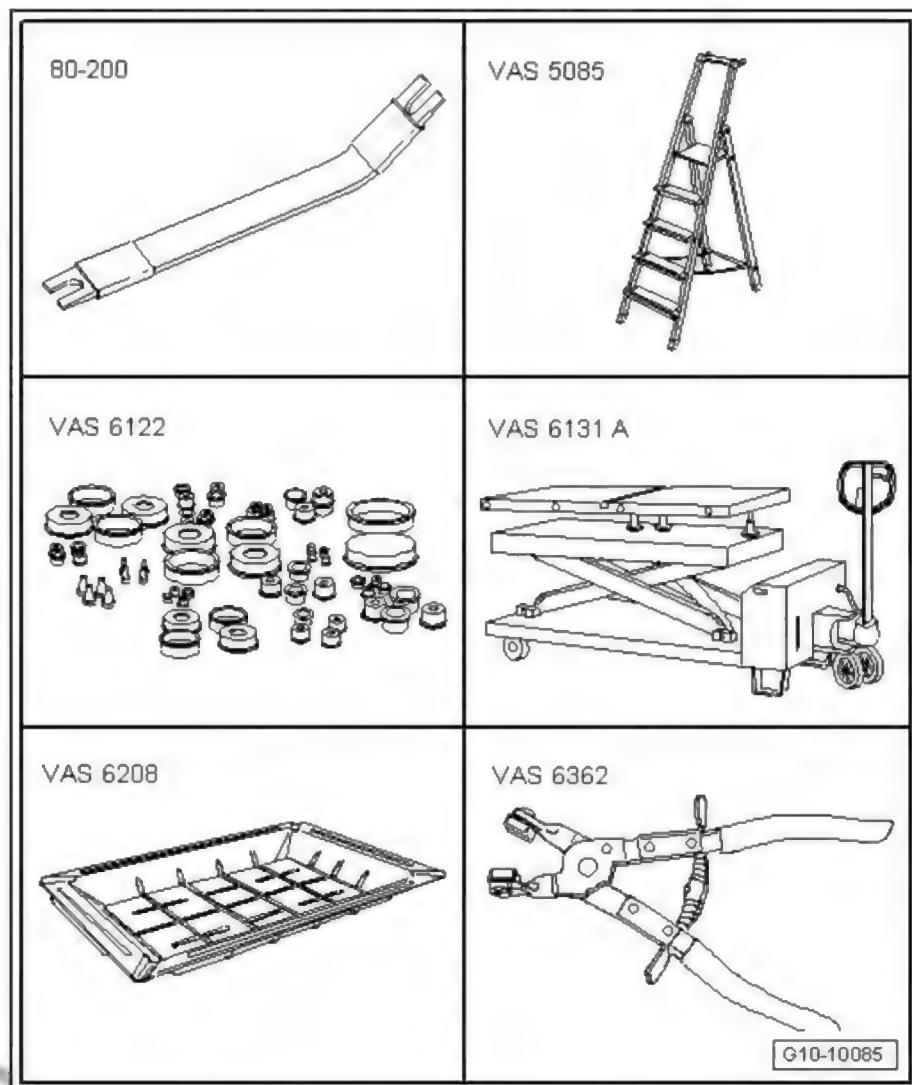
Take care not to bend or kink selector lever cable.

- Lower engine/gearbox assembly further.
- Pull out scissor-type assembly platform - VAS 6131 B- with engine/gearbox assembly from underneath vehicle.



1.1.2 Removing engine - vehicles with automatic gearbox

Special tools and workshop equipment required



◆ Removal lever - 80 - 200-

◆ Stepladder - VAS 5085-

◆ Engine bung set - VAS 6122-

- ◆ Scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10-, support set -VAS 6131/11- and supplementary set -VAS 6131/13-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Hose clip pliers -VAS 6362-
- ◆ Support set for Audi - VAS 6131/10-



- ◆ Supplementary set -VAS 6131/11-
- ◆ Supplementary set, Audi Q7 >2005 - VAS 6131/13-



Procedure



Note

- ◆ The engine is removed from underneath together with the gearbox and subframe (with lock carrier installed).
- ◆ Fit cable ties in the original positions when installing.



WARNING

Make sure the vehicle cannot tip over when the engine is removed.

- ◆ Secure the vehicle, to do so, the luggage compartment must be empty.

The fuel system operates at extremely high pressure. This can cause injury.

- ◆ The fuel pressure in the high-pressure section of the injection system must be dissipated prior to opening the system.

- Bring front wheels into straight-ahead position.

 Note

The electromechanical parking brake must be released before disconnecting the battery so that the propshaft can be turned during removal.

- Switch off ignition and remove ignition key.
- Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
- Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a .
- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Remove propshaft ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .
- Pull engine cover panels -1- and -2- off upwards.



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WARNING

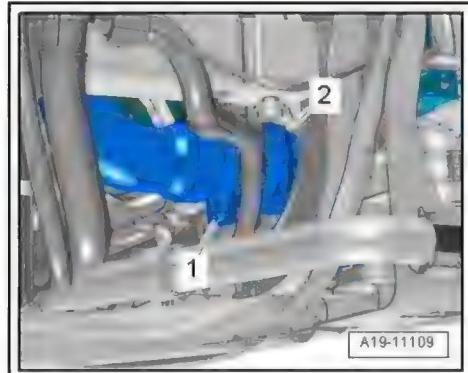
The cooling system is under pressure when the engine is hot.
Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

- Put on protective gloves.
- Put on safety goggles.
- Cover filler cap on expansion tank with a cloth and open carefully to release pressure.

- Open filler cap -arrow- on coolant expansion tank.
- Remove both front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .
- Remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Remove drain plug -1- and drain off coolant.
- Lift retaining clip -2- and disconnect coolant hose from radiator.



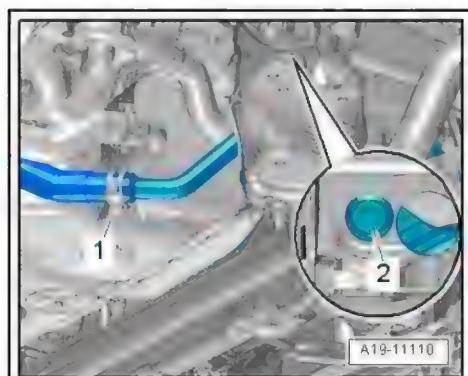
A19-11109

- Release hose clip -1-, disconnect coolant hose from coolant pipe (bottom left) and drain off coolant.



Note

Disregard -item 2-.



A19-11110

- Release hose clips -1- and -3-, disconnect coolant hoses from coolant pipes (front left) and drain off remaining coolant.

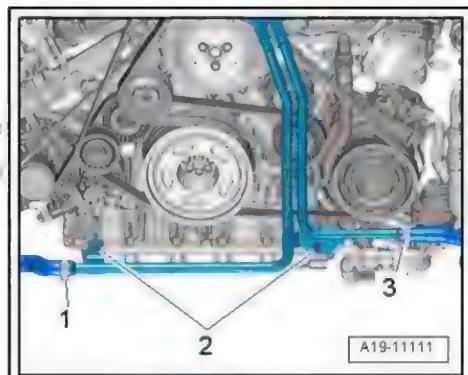


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◆ **For illustration purposes, the installation position is shown with the engine removed.**

◆ *Disregard -item 2-.*

- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



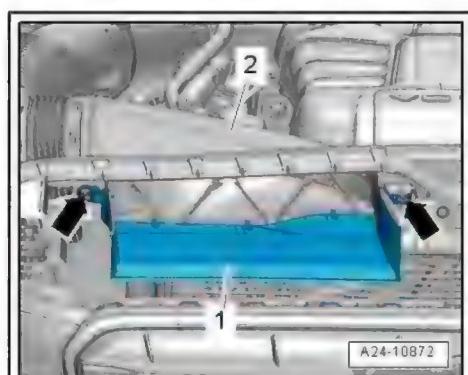
A19-11111

- Remove bolts -arrows- and detach air duct -1-.



Note

Disregard -item 2-.

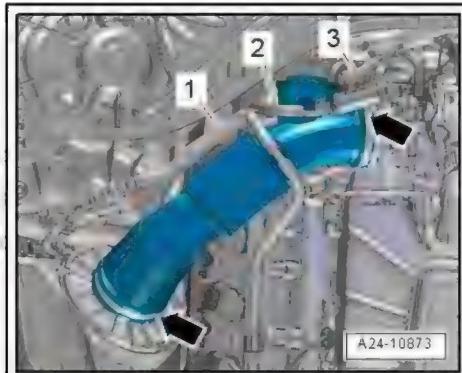


A24-10872

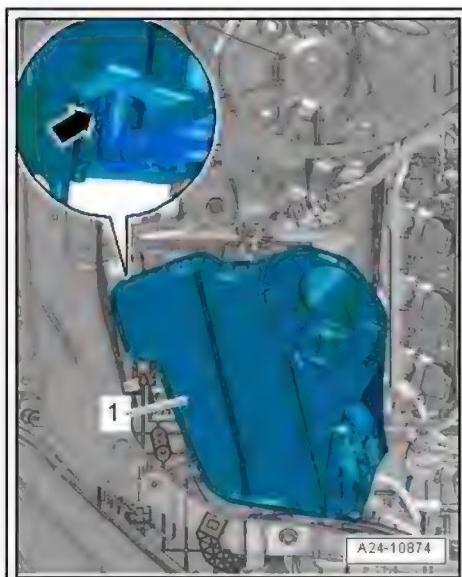
- Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Loosen hose clips -arrows- and detach air pipe.

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- Lift off air cleaner housing -1-.
- Press release tabs and disconnect secondary air hose -arrow-.



- Release hose clip -1- and disconnect vacuum hose from plenum chamber partition panel.
- Unplug electrical connector -2- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -3-.
- Detach activated charcoal filter solenoid valve 1 - N80- from bracket and move it clear to the side with hoses still attached.

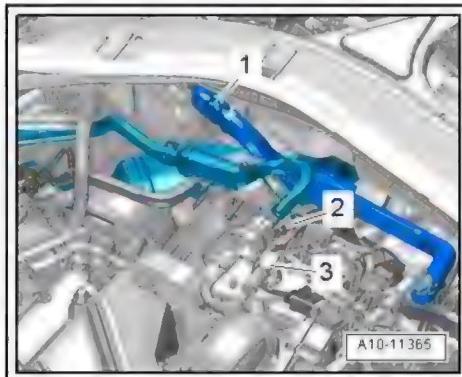


WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap a clean cloth around connection and open connection carefully).

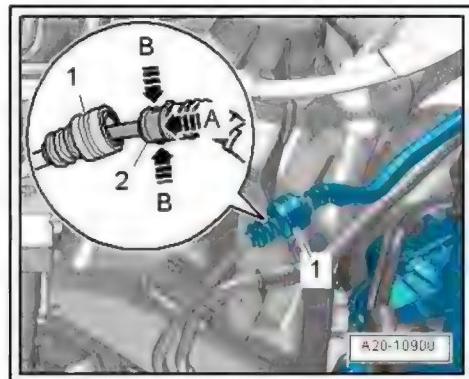


Caution

Take care to keep components clean.

- ◆ Observe rules for cleanliness when working on the fuel supply system [⇒ page 5](#).

- Disconnect fuel line -1- ⇒ Fuel supply system; Rep. gr. 20 ;
 Plug-in connectors; Disconnecting plug-in connectors .
- Seal off open lines and connections with clean plugs from
 engine bung set - VAS 6122- .

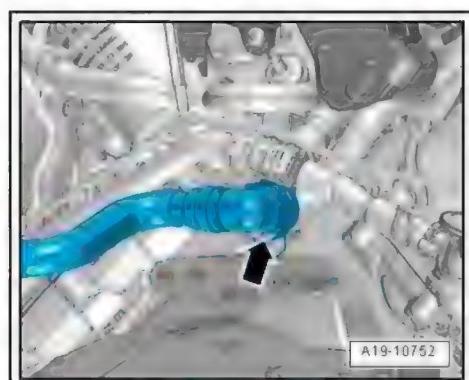


- Lift retaining clip -arrow- and detach coolant hose going to heat exchanger from rear of engine.



Note

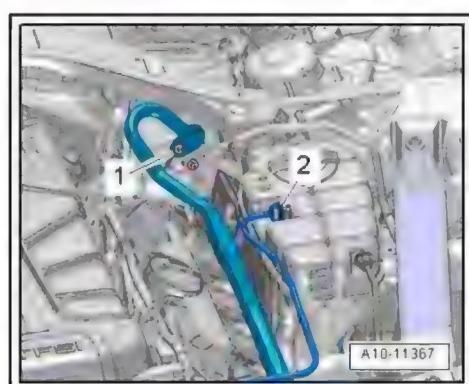
For illustration purposes, the installation position is shown with the engine removed.



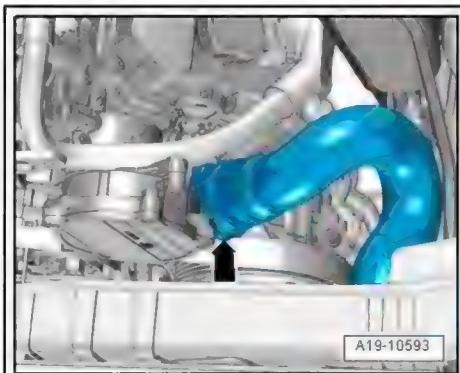
- Lift retaining clip -arrow- and detach coolant hose (front right)
 from coolant pipe (front).



- Lift retaining clip -2- and disconnect coolant line.
- Remove bolt -1- and move refrigerant line clear.



- Lift retaining clip -arrow-, detach coolant hose (left-side) from coolant pipe (front) and move coolant hose clear.

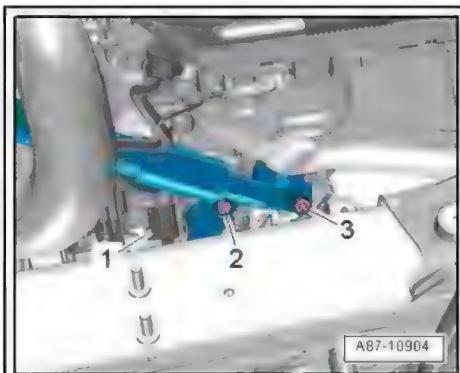


Caution

Risk of damage to refrigerant lines and hoses

- ◆ *Do NOT stretch, kink or bend refrigerant lines and hoses.*

- Unscrew bolt -2- and remove refrigerant line from air conditioner compressor.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .



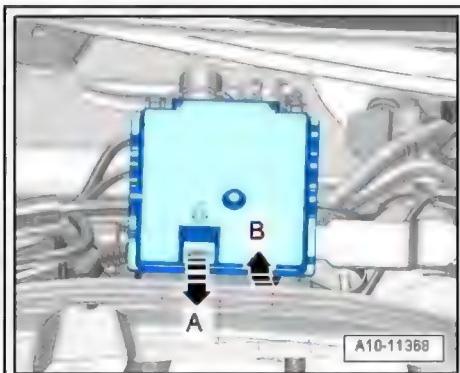
Note

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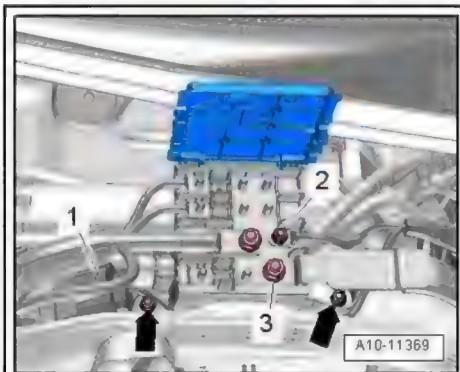
Disregard items -1 and 3-

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- Remove body brace ⇒ **Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .**
- Release retainer -arrow A- and open cover -arrow B-.



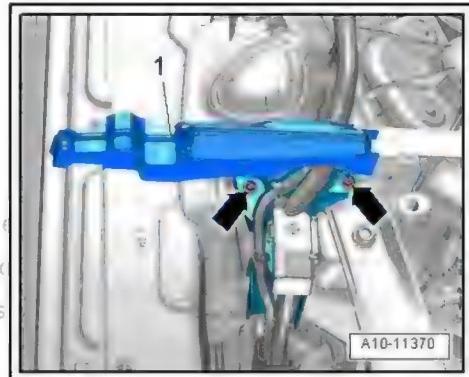
- Remove nuts -2 and 3- and move electrical wiring clear.
- Detach electrical connector -1- from bracket and unplug.
- Remove nuts -arrows- and detach terminal 30 wiring junction - TV2- from plenum chamber partition panel.



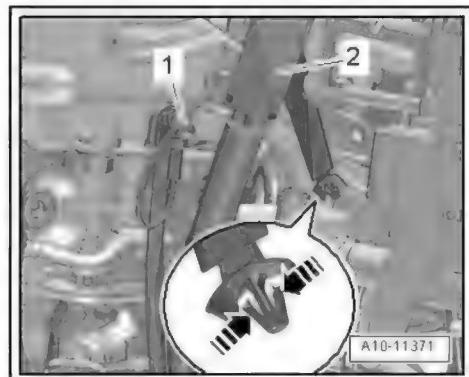
- Press foam wedge -1- to one side.
- Remove bolts -arrows-.



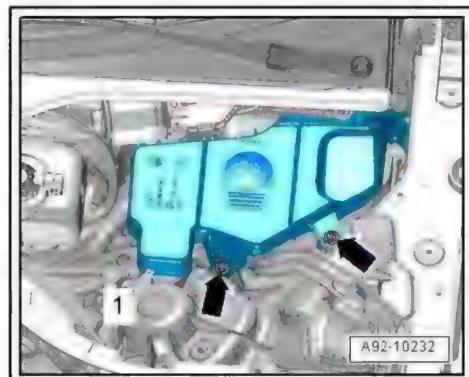
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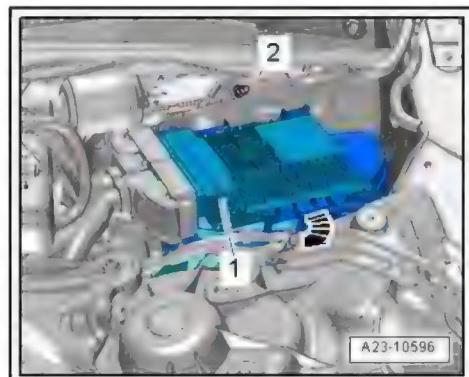
- Release fasteners -arrows- and move clear cable guide -2- .
- Remove cap nut -1- and move earth wiring clear.



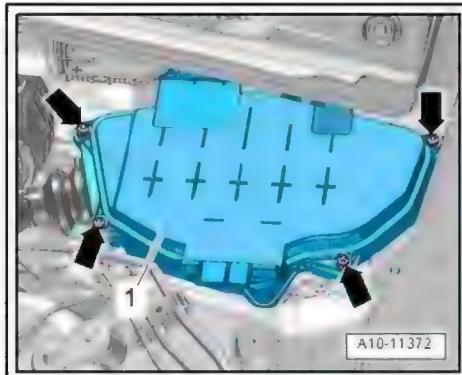
- Unscrew bolts -arrows- and pull filler neck -1- out of washer fluid reservoir and through opening in body to right side.



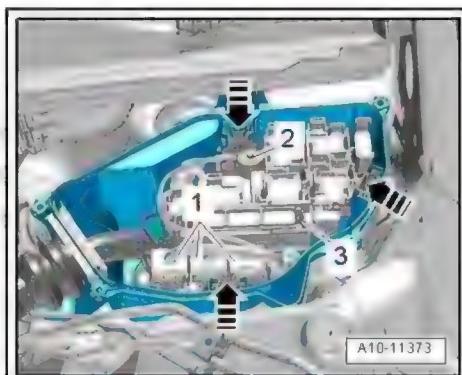
- Remove cap nut -2- and move earth wiring clear.
- Release fastener -arrow-, detach engine control unit - J623-
-item 1- from bracket and swivel it to one side.



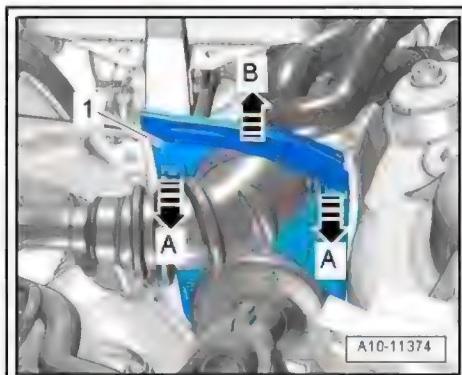
- Remove bolts -arrows- and detach cover -1- for electronics box in plenum chamber.



- Unplug electrical connectors -1- and unscrew nut -2- for electrical wiring.
- Release catches -arrows- and detach relay carrier with fuse holder -3-.
- Disengage engine wiring harness at electronics box in plenum chamber and move clear.



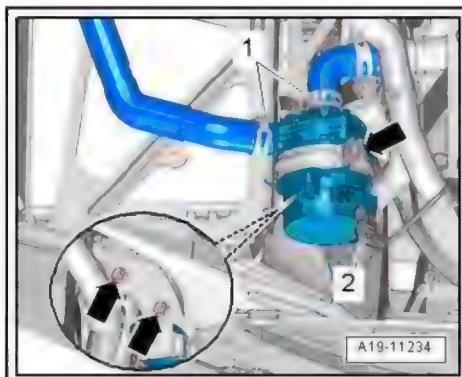
- Release catches -arrows A- and lift off wiring protector -1- -arrow B-.
- Place wiring harness on engine and secure engine/motor control unit - J623- to prevent it from dropping.



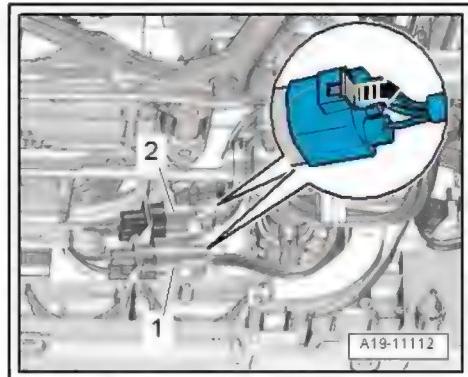
- Unplug electrical connector -2- from charge air cooling pump - V188- and move clear.



-Item 1- and -arrows- can be disregarded.



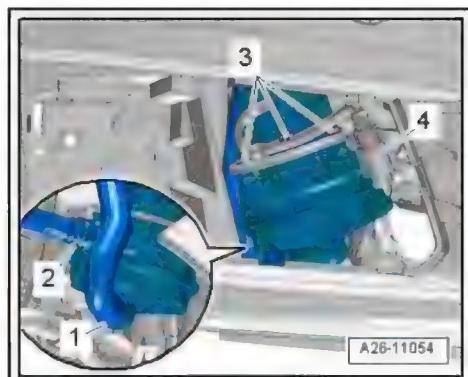
- Unplug electrical connectors -1- and -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).
- Move electrical wiring harness clear.



- Unplug electrical connector -4- at secondary air pump motor -V101- and move electrical wiring clear.
- Press release tabs, disconnect secondary air hose -2- and move hose clear.



Disregard items -1 and 3-.

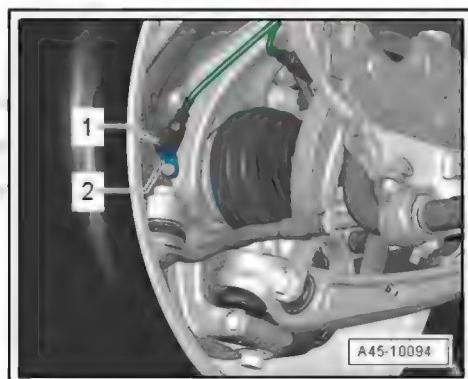
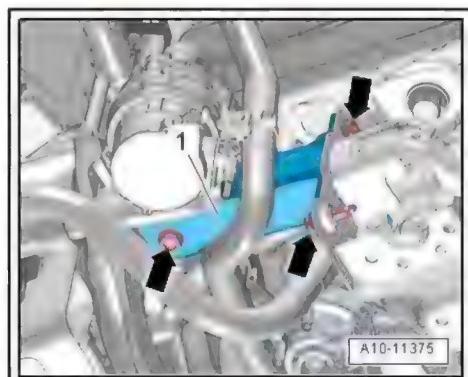


- Remove bolts -arrows- (left and right) and detach longitudinal member (bottom front) -1-.



- Unplug electrical connector -1- at front wheel speed sensor -2- -G45- / -G47- on both sides.

! ! Observe the mounting location for the front wheel speed sensor to prevent damage to the sensor or the sensor cable. If the sensor is damaged, it must be replaced by Audi AG. Audi AG reserves the right to demand compensation for damage caused by the removal or the re-use of a damaged sensor. Damage to the sensor or the sensor cable may result in the loss of vehicle control and cause an accident.



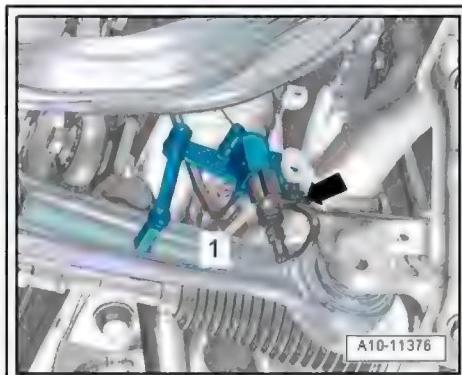
- If fitted, unplug electrical connector -1- at front vehicle level senders on both sides (-G78- and -G289-) and move electrical wiring clear -arrow-.
- Remove brake caliper and tie up in wheel housing with wire (brake hose remains attached) ⇒ Brake system; Rep. gr. 46 ; Front brakes; Removing and installing brake caliper .



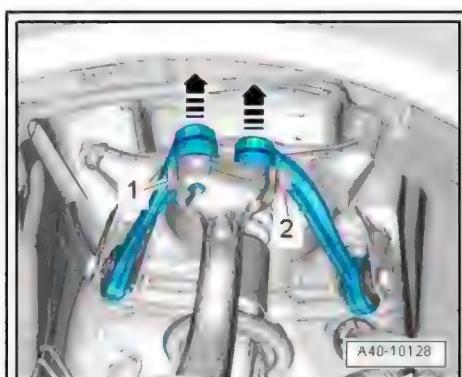
Caution

Risk of damage to brake pistons.

- ◆ *Do not press brake pedal with brake caliper removed.*



- Remove nut -2- and pull out bolt -1-.
- Pull upper suspension links upwards out of wheel bearing housing -arrows-.
- Repeat procedure on opposite side of vehicle.



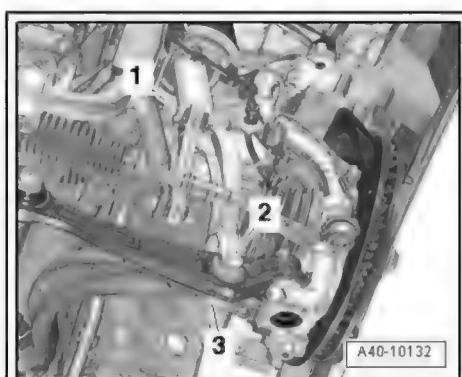
- Remove bolt -1- for anti-roll bar on both sides.
- Remove nut -3- on both sides.



Note

The bolts -2- are removed at a later stage.

- Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing subframe cross brace .



Caution

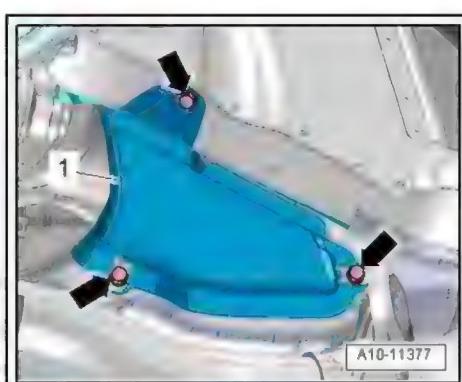
Risk of damage to running gear components.

- ◆ *The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.*

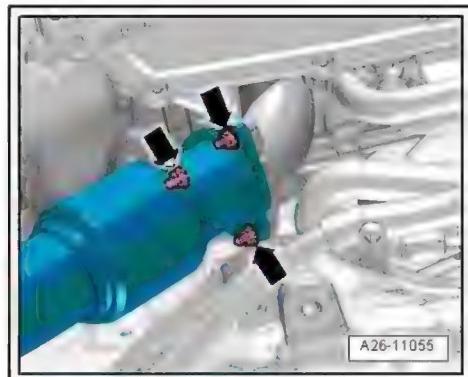
- Remove bolts -arrows- on both sides and detach heat shield -1- on subframe.



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- Unscrew nuts -arrows- and detach front silencer (left-side).



A26-11055

- Unscrew nuts -arrows- and detach front silencer (right-side).
- Detach intermediate steering shaft from steering rack and move clear by telescoping splines together ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .

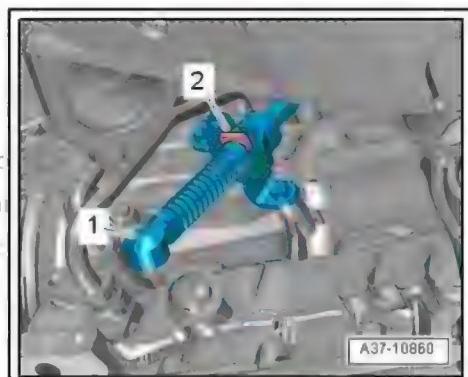


A26-11056

- Pry ball socket -1- of selector lever cable off gearbox selector lever using removal lever - 80 - 200- .
- Press off securing clip -2- and remove selector lever cable from gearbox.

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Note Take care not to bend or kink selector lever cable.



A37-10860

- Unplug electrical connector -2- at steering rack (release retainer -arrow- and press down release catch).
- Unplug electrical connector -1-.
- Move electrical wiring harness clear.

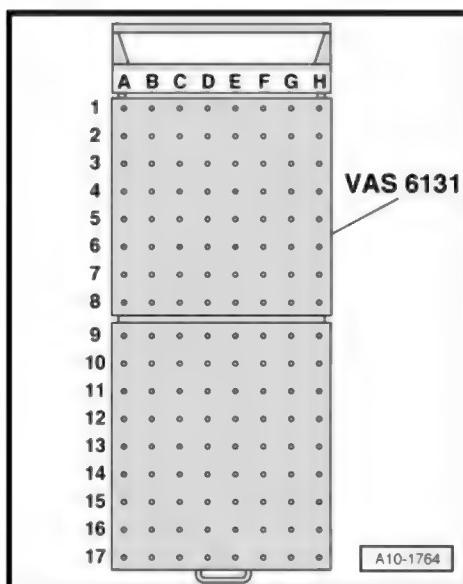


A48-10592

Set up the scissor-type assembly platform as follows:

- Set up scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13- as follows:

Platform coordinates	Parts of support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13-				
B4	/13-4	/10-4	/10-5	/13-1	
G4	/13-4	/10-4	/10-5	/13-1	
B6	/10-1	/10-2	/10-5	/10-11	
G6	/10-1	/10-2	/10-5	/10-11	
A8+C8	/13-6	–	–	/13-2	
F8+H8	/13-5	–	–	/13-2	
B14	/10-1	/10-3	/10-5	/11-1	
G14	/10-1	/10-4	/10-5	/11-1	



A10-1764

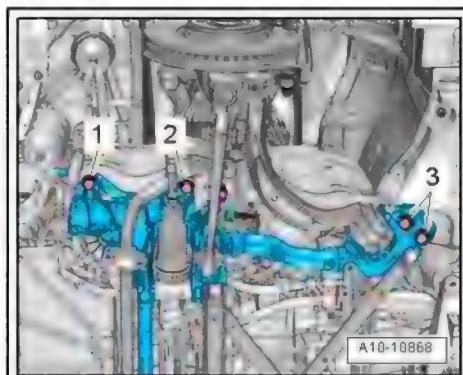
- Initially hand-tighten the support elements on the scissor-type assembly platform.
- Position scissor-type assembly platform - VAS 6131 B- horizontally.
- Take note of spirit level (bubble gauge).
- Position scissor-type assembly platform - VAS 6131 B- below engine/gearbox assembly.



WARNING

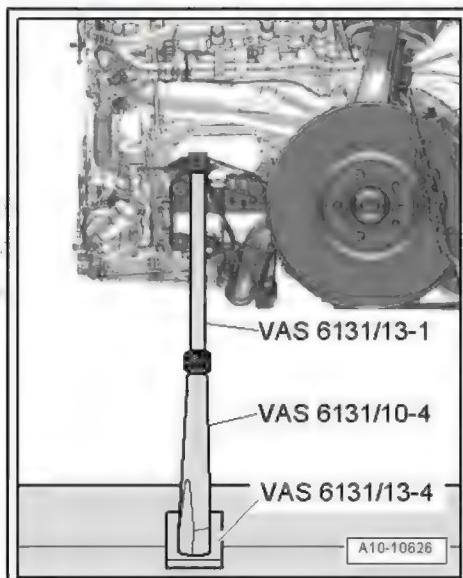
Accident risk if subframe mountings are detached.

- ◆ Subframe bolts -2- and -3- must not be loosened.



A10-10868

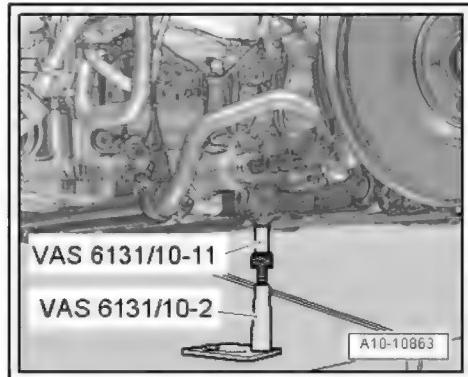
- Remove subframe bolts -1- on both sides.



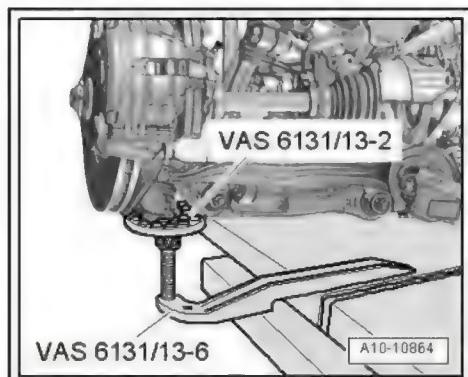
A10-10826

- Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.
- Make sure that threaded spindles are screwed in completely.

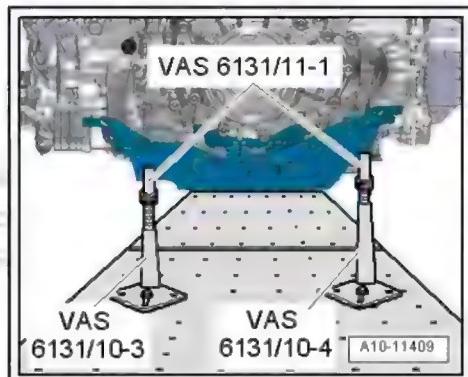
- Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.



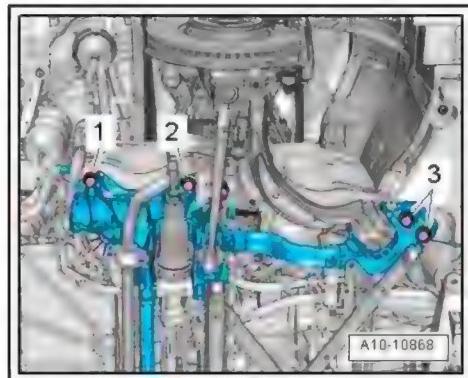
- Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.



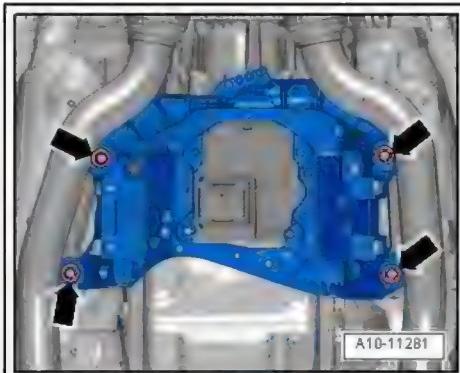
- Position support elements from -VAS 6131/10- and -VAS 6131/11- (rear left and right) at tunnel cross member as shown.
- Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
- Tighten base plates for support elements to 20 Nm on scissor-type assembly platform A/VAS 6131 B-A.



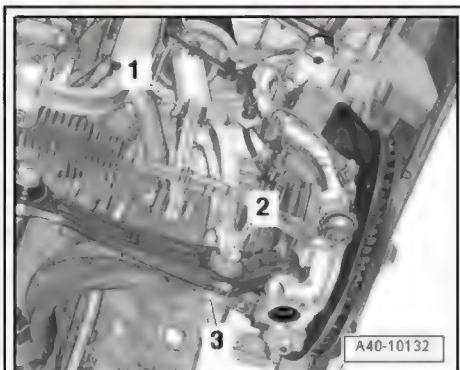
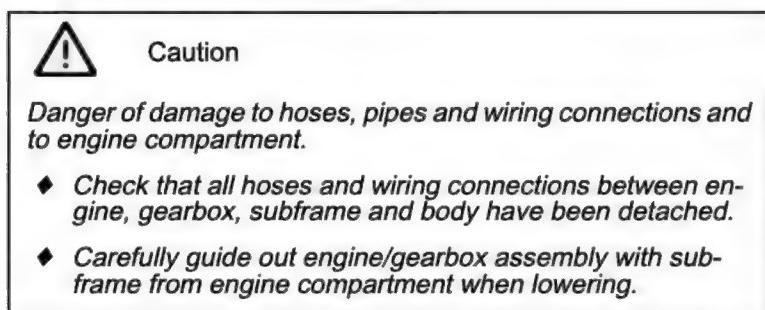
- Mark installation position of subframe and tunnel cross member on longitudinal members with felt-tip pen.
- Unscrew subframe bolts -2- and -3- on both sides in several stages and in diagonal sequence.



- Remove bolts -arrows- on tunnel cross member.



- Remove bolt -2- on both sides.



- Lower engine/gearbox assembly.
- Pull out scissor-type assembly platform - VAS 6131 B- with engine/gearbox assembly from underneath vehicle.

1.2 Separating engine and gearbox

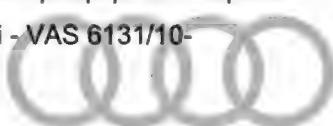
⇒ “1.2.1 Separating engine and gearbox - vehicles with dual clutch gearbox”, page 36

⇒ “1.2.2 Separating engine and gearbox - vehicles with automatic gearbox”, page 41

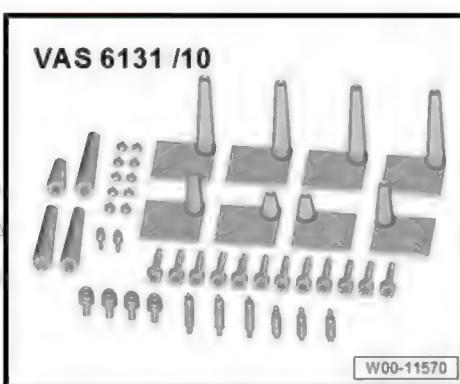
1.2.1 Separating engine and gearbox - vehicles with dual clutch gearbox

Special tools and workshop equipment required

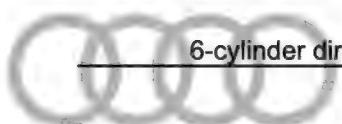
- ◆ Support set for Audi - VAS 6131/10



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- ◆ Supplementary set -VAS 6131/11-



- ◆ Support -VAS 6131/13-7- from support set, Audi Q7 >2005 -
VAS 6131/13-

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- ◆ Adapter - T40058-



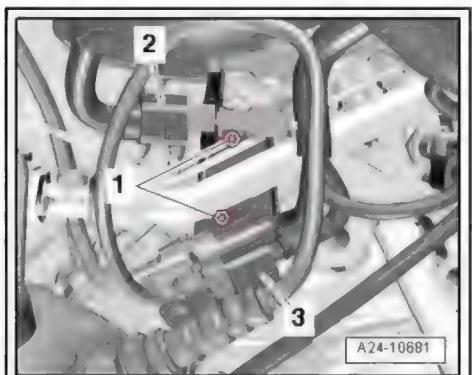
Procedure

- Engine/gearbox assembly removed and secured to scissor-type assembly platform - VAS 6131 B-
- Remove electrical connector -3- for Lambda probe 2 after catalytic converter - G131- from bracket and unplug connector.

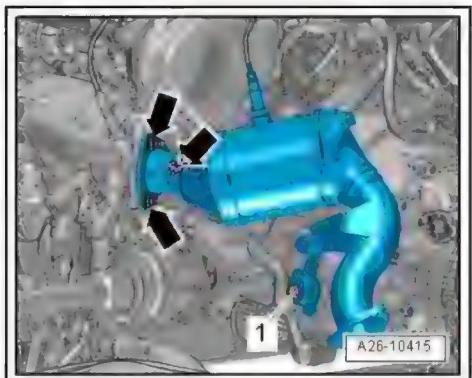


Note

Disregard items -1 and 2.



- Remove bolt -1- and nuts -arrows- and detach catalytic converter (left-side).

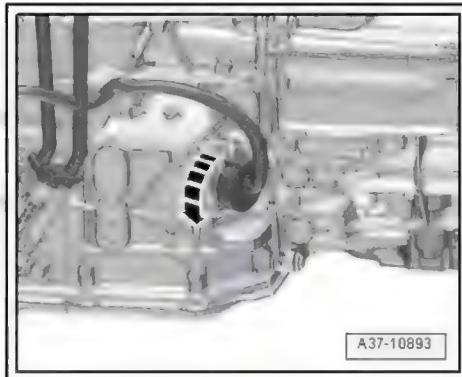




Caution

Risk of irreparable damage to gearbox control unit (mechatronic unit) because of static discharge.

- ◆ Do NOT touch connector contacts in gearbox connector with your hands.



A37-10893

- Touch gearbox housing with your hand (without wearing gloves) to eliminate static charge.
- Turn retainer catch anti-clockwise -arrow- and unplug electrical connector at gearbox.
- Move electrical wiring harness clear at gearbox.
- Release hose clip -1- and detach coolant hose.



Note

Disregard -item 2-.



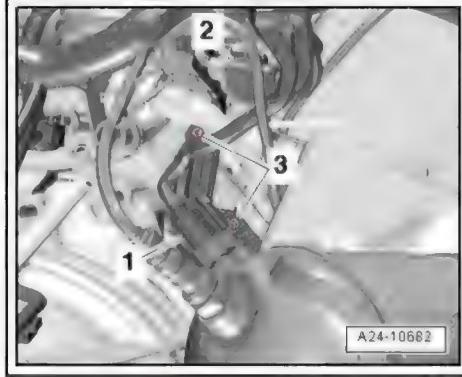
A10-11380

- Remove electrical connector -1- for Lambda probe after catalytic converter - G130- from bracket and unplug connector.



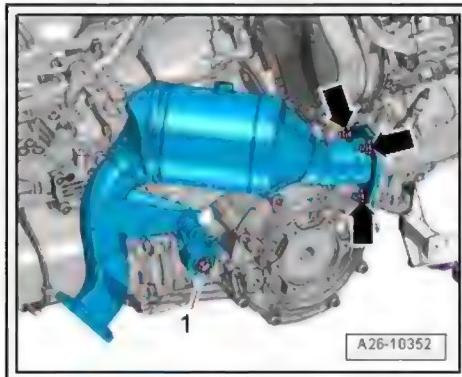
Note

Disregard items -2 and 3-.



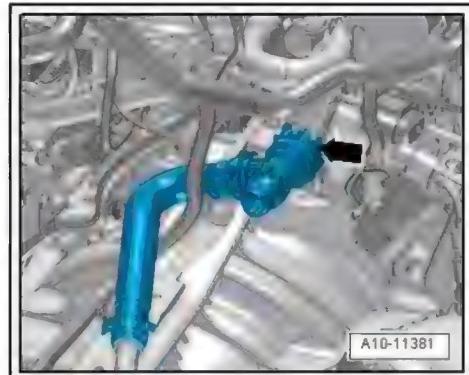
A24-10682

- Remove bolt -1- and nuts -arrows- and detach catalytic converter (right-side).



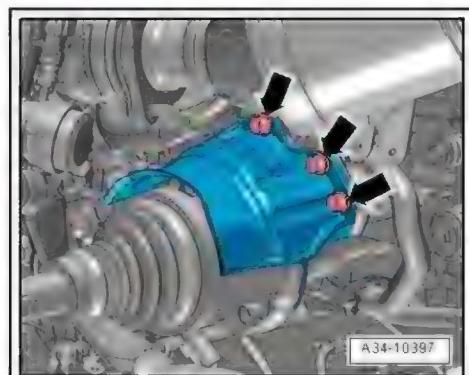
A26-10352

- Lift retaining clip -arrow- and detach connection from coolant pipe (top).



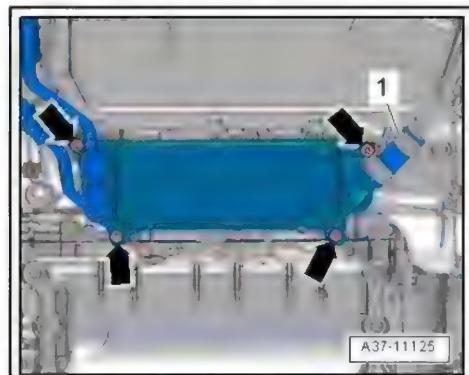
A10-11381

- Remove bolts -arrows- and detach heat shield for drive shaft (left-side).
- Unbolt drive shaft (left and right) from gearbox flange shafts
 ➔ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft;
 Removing and installing drive shaft .



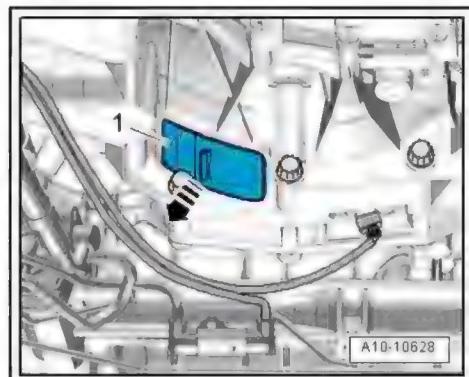
A34-10397

- Remove bolts -arrows-.
- Release hose clip -1- and detach ATF cooler from coolant pipe on right side of gearbox.
- Swivel ATF cooler to the side.



A37-11125

- Detach bottom cover -1- from gearbox -arrow-.

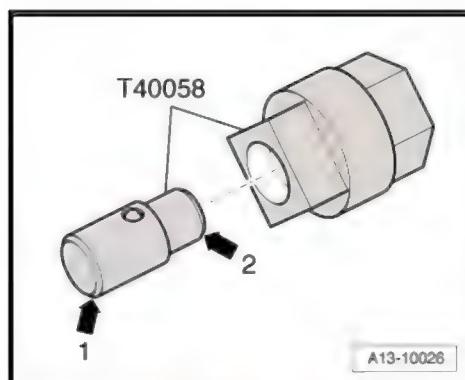


A10-10628

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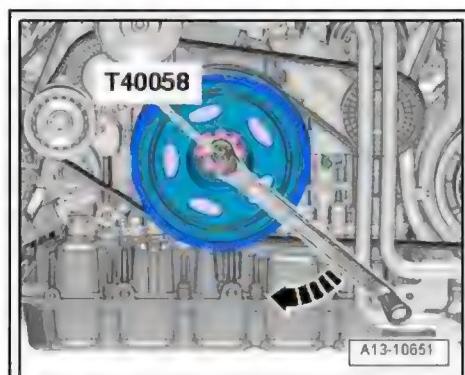
- Insert guide pin of adapter -T40058- as follows:
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



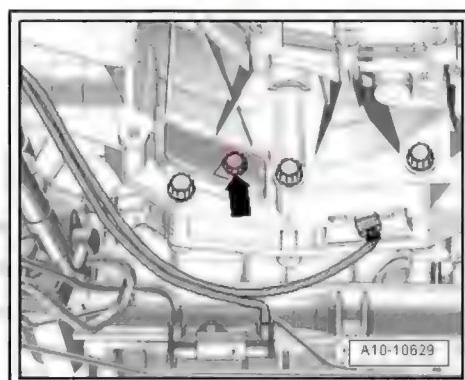
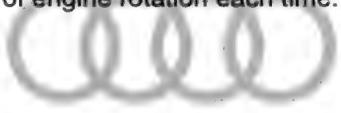
- Counterhold crankshaft using adapter - T40058- and angled ring spanner when loosening bolts for drive plate.



Only rotate crankshaft in direction of engine rotation -arrow-.



- Remove 6 bolts -arrow- for clutch module. Turn crankshaft 60° in direction of engine rotation each time.

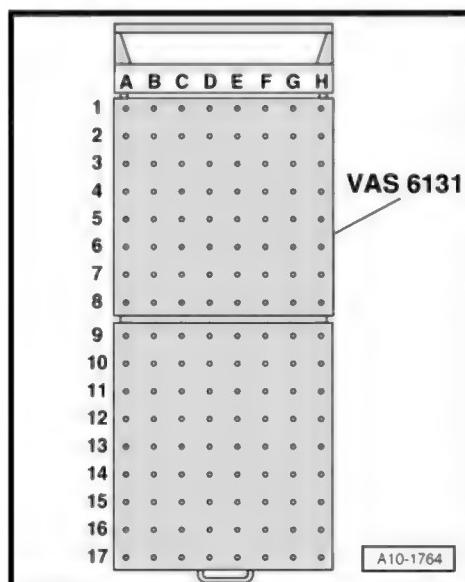


- Set up scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10-, supplementary set -VAS 6131/11- and support -VAS 6131/13-7- as follows:

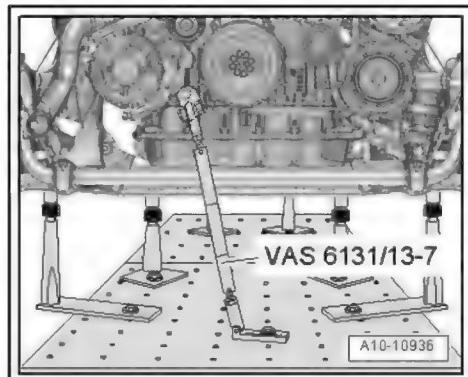


The other support elements remain unchanged.

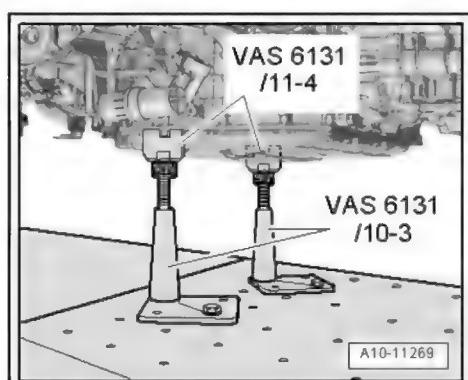
Platform coordinates	Parts from support set for Audi - VAS 6131/10-, supplementary set -VAS 6131/11- and support - VAS 6131/13-7-			
F2	/13-7			
B10	/10-1	/10-3	/10-5	/11-4
G10	/10-1	/10-3	/10-5	/11-4



- Secure support -VAS 6131/13-7- at tapped hole at front of engine (right-side) as illustrated.
- Secure support -VAS 6131/13-7- to scissor-type assembly platform and tighten to 20 Nm.



- Position support elements from -VAS 6131/10- and mountings -VAS 6131/11-4- at front of gearbox, as shown in illustration.
- Screw spindles upwards on both sides until mountings -VAS 6131/11-4- make full contact with gearbox.
- Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 B- .

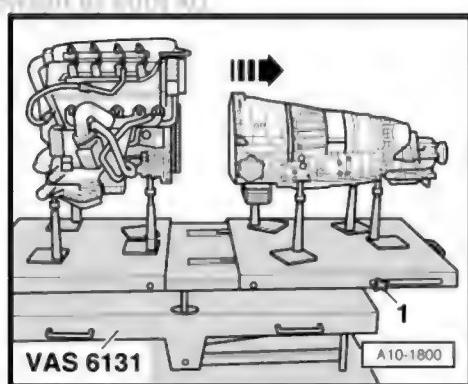
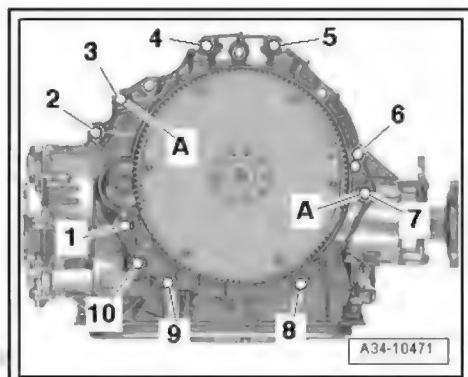


- Remove bolts -1- and -2- for starter.
- Separate starter from gearbox and leave in position.
- Unscrew remaining bolts -3 ... 10- securing engine to gearbox.



Disregard -item A-.

- Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 B- and pull rear section of platform together with gearbox towards rear -arrow-.



1.2.2 Separating engine and gearbox - vehicles with automatic gearbox

Special tools and workshop equipment required

◆ Support set for Audi - VAS 6131/10-



◆ Support -VAS 6131/13-7- from support set, Audi Q7 >2005 -
VAS 6131/13-



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- ◆ Gearbox support - VAS 6131/14-
◆ Adapter - T40058-

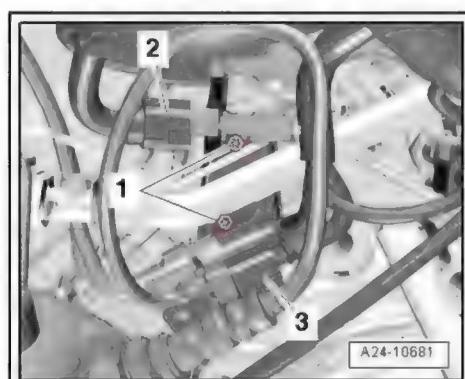


Procedure

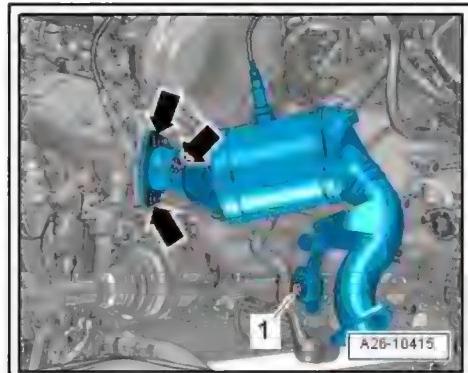
- Engine/gearbox assembly removed and secured to scissor-type assembly platform - VAS 6131 B-
- Remove electrical connector -3- for Lambda probe 2 after catalytic converter - G131- from bracket and unplug connector.



Disregard items -1 and 2-.



- Remove bolt -1- and nuts -arrows- and detach catalytic converter (left-side).

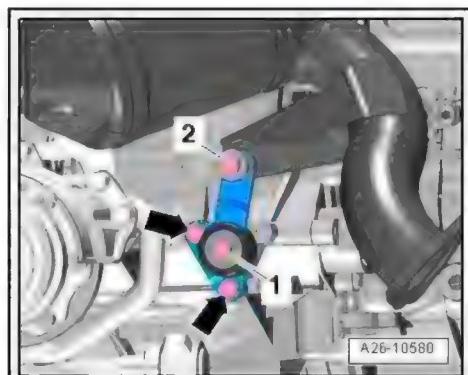


- Remove bolts -arrows- and remove bracket.



Note

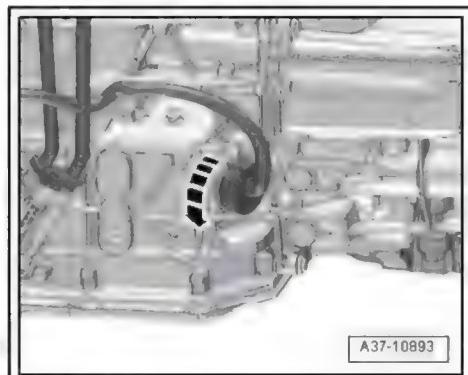
Disregard items -1 and 2-



Caution

Risk of irreparable damage to gearbox control unit (mechatronic unit) because of static discharge.

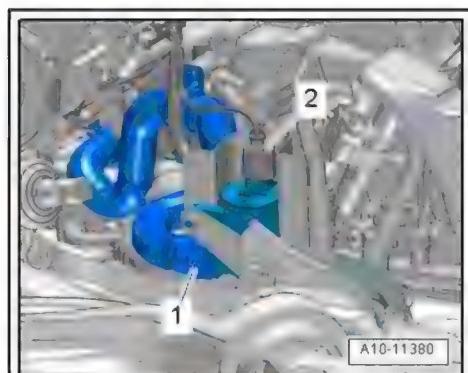
- ◆ *Do NOT touch connector contacts in gearbox connector with your hands.*



- Touch gearbox housing with your hand (without wearing Protec gloves) to eliminate static charge or commercial purposes, in p

permit Turn retainer catch anti-clockwise -arrow- and unplug electrical connector at gearbox, with respect to the correctness of information (Fahrzeugelektronik). Copyright by AUDI AG.

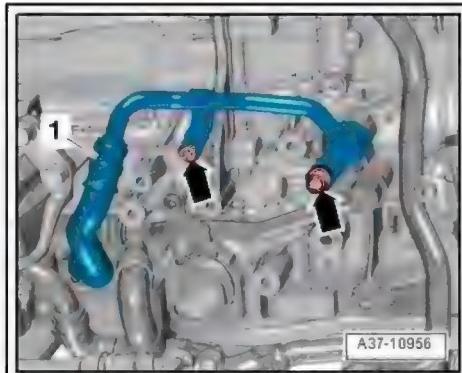
- Move electrical wiring harness clear at gearbox.
- Release hose clip -1- and detach coolant hose.
- Unplug electrical connector -2-.



 Note

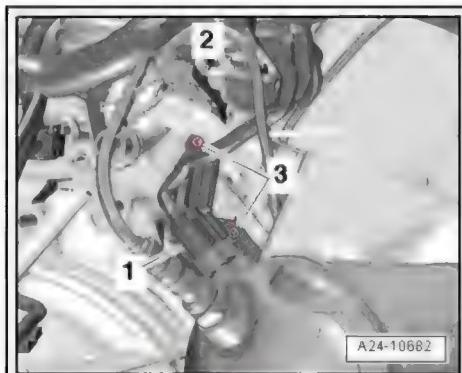
Place a cloth underneath to catch escaping ATF.

- Remove bolts -arrows- and detach ATF line -1- from gearbox.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .
- Remove electrical connector -1- for Lambda probe after catalytic converter - G130- from bracket and unplug connector.

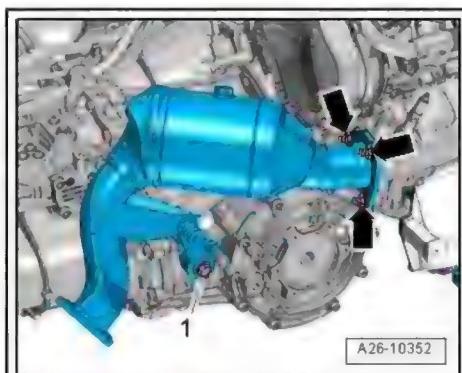


 Note

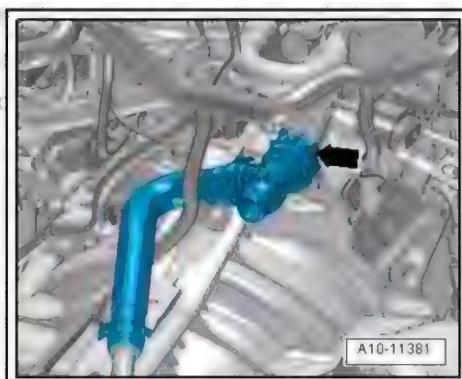
Disregard items -2 and 3-.



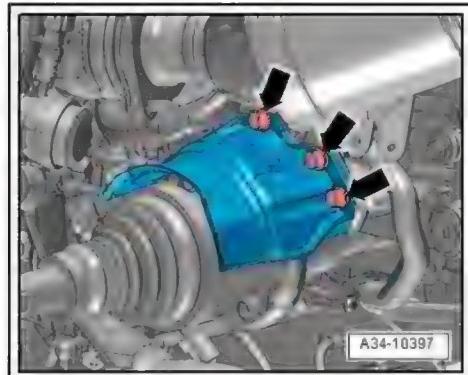
- Remove bolt -1- and nuts -arrows- and detach catalytic converter (right-side).



- Lift retaining clip -arrow- and detach connection from coolant pipe (top). not permitted unless authorised by AUDI AG. AUDI AG does not accept responsibility for any damage resulting from failure to observe this instruction.



- Remove bolts -arrows- and detach heat shield for drive shaft (left-side).
- Unbolt drive shaft (left and right) from gearbox flange shafts
 ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .

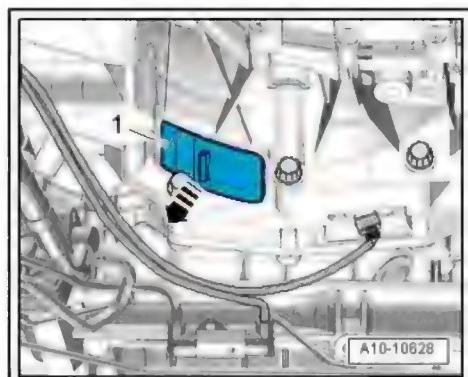
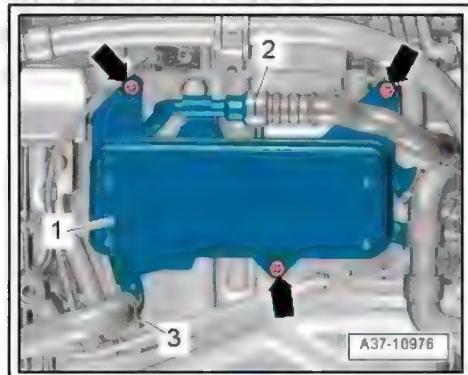


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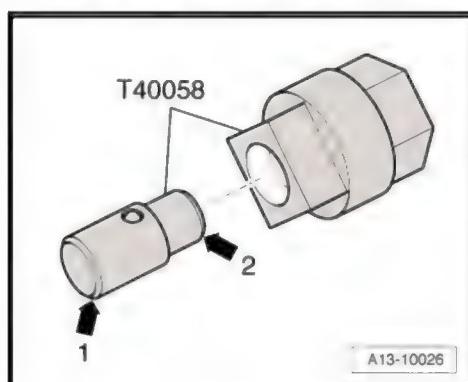


Place a cloth underneath to catch escaping ATF.

- Release hose clip -3- and detach coolant hose.
- Remove bolts -arrows- and tie up ATF cooler -1- to side with coolant hose -2- attached.
- Swivel ATF cooler to the side.
- Detach bottom cover -1- from gearbox -arrow-.



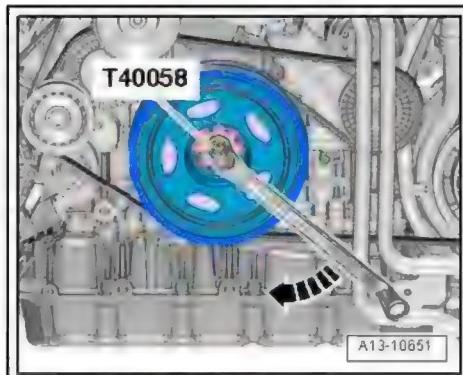
- Insert guide pin of adapter -T40058- as follows:
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



- Counterhold crankshaft using adapter - T40058- and angled ring spanner when loosening bolts for drive plate.



Only rotate crankshaft in direction of engine rotation -arrow-.



- Remove 6 bolts -arrow- for clutch module. Turn crankshaft 60° in direction of engine rotation each time.



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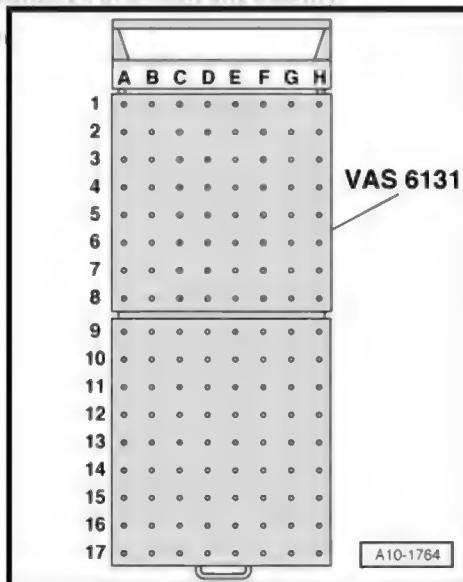
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- Set up scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10-, support-VAS 6131/13-7- and gearbox support - VAS 6131/14- as follows.

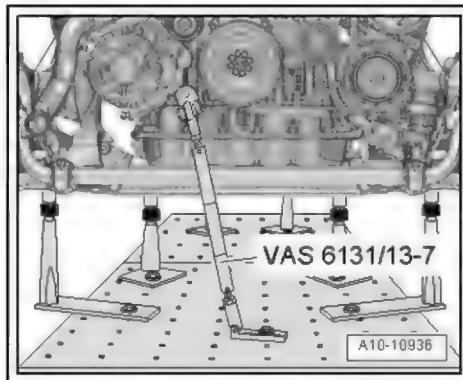


The other support elements remain unchanged.

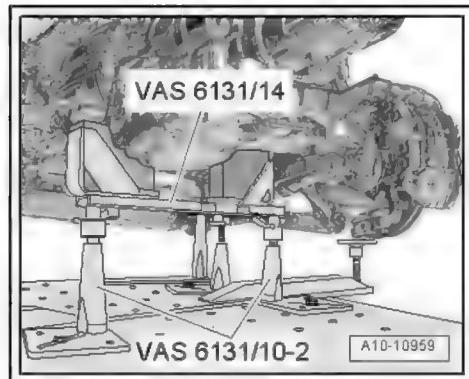
Platform coordinates	Parts from support set for Audi - VAS 6131/10-, support -VAS 6131/13-7- and gearbox support - VAS 6131/14-						
F2	/13-7						
B10	/10-1	/10-2	/10-5	/14			
G10	/10-1	/10-2	/10-5				



- Secure support -VAS 6131/13-7- at tapped hole at front of engine (right-side) as illustrated.
- Secure support -VAS 6131/13-7- to scissor-type assembly platform and tighten to 20 Nm.



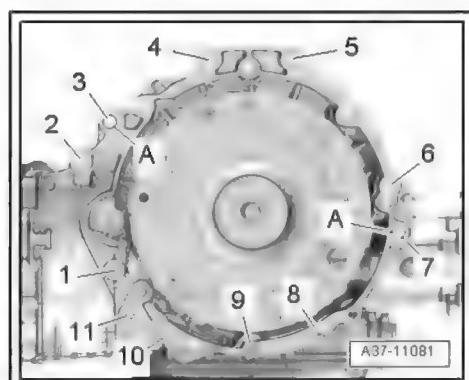
- Position support elements from -VAS 6131/10- and gearbox support - VAS 6131/14- at front of gearbox, as illustrated.
- Screw spindles on both sides upwards until gearbox support - VAS 6131/14- makes full contact with gearbox.
- Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 B- .



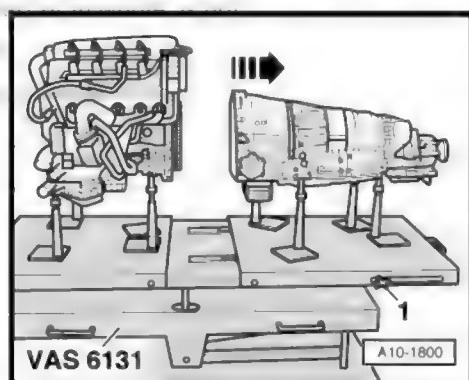
- Remove bolts -1- and -2- for starter.
- Separate starter from gearbox and leave in position.
- Unscrew remaining bolts -3 ... 11- securing engine to gearbox.



Disregard -item A-



- Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 B- and pull rear section of platform together with gearbox towards rear -arrow-.

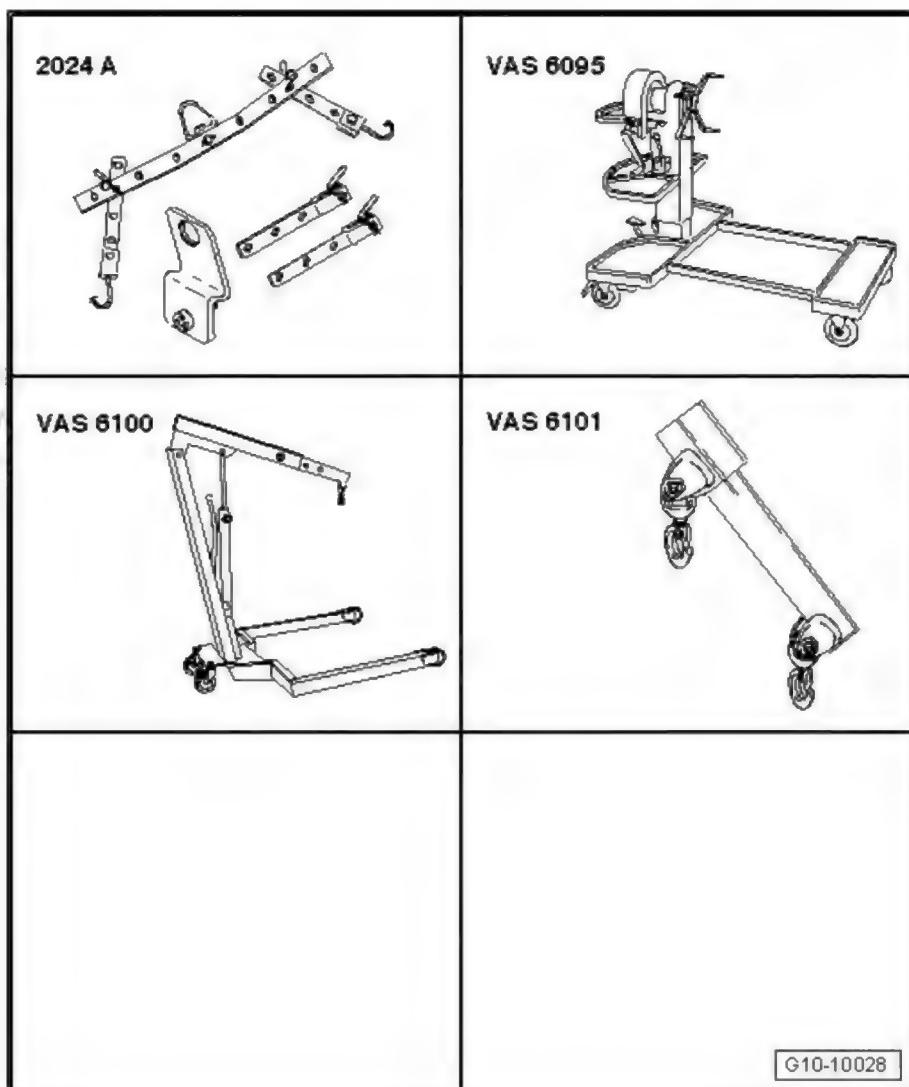


1.3 Securing engine to engine and gearbox support

Special tools and workshop equipment required



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- ◆ Lifting tackle - 2024 A-
- ◆ Engine and gearbox support - VAS 6095- with universal mounting - VAS 6095/1- and bracket for V6 FSI engine, Audi A6 - VAS 6095/1-5-
- ◆ Workshop hoist - VAS 6100-
- ◆ Lift arm extension/workshop hoist - VAS 6101-

Procedure



WARNING

Risk of accident!

- ◆ *The engine can only be transported with the gearbox removed using the method described.*

- Engine/gearbox assembly removed; engine separated from gearbox.
- Engine secured with support -VAS 6131/13-7- .
- Detach poly V-belt from air conditioner compressor ⇒
["1.2.2 Removing and installing poly V-belt for ancillaries"](#)
[page 73](#) .

- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .
- Attach lifting tackle - 2024 A- to engine lifting eyes and workshop hoist as shown in illustration.



Note

To adjust to the centre of gravity of the assembly, the perforated rails of the support hooks must be positioned as shown.

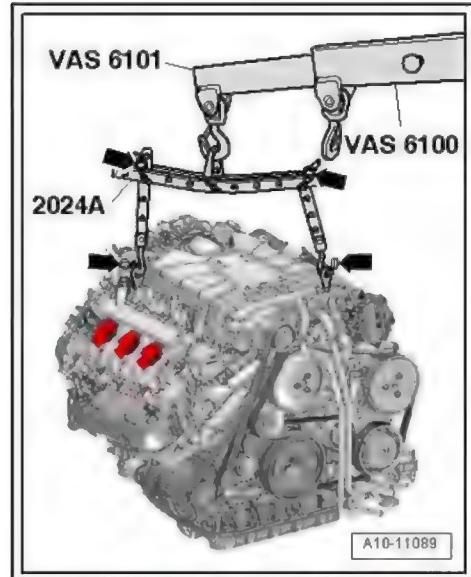


WARNING

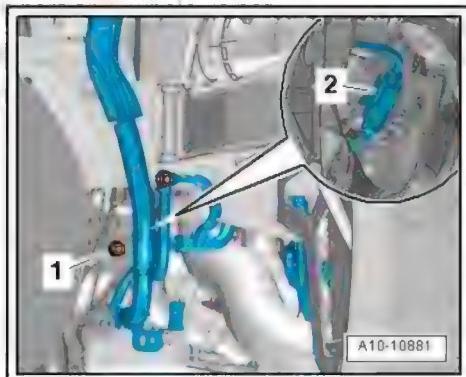
Risk of accident.

- ◆ The support hooks and retaining pins on the lifting tackle must be secured with locking pins -arrows-.

- Take up weight of engine with workshop hoist, but do not lift.



- Take electrical connectors -2- for electrohydraulic engine mounting solenoid valves out of brackets and unplug (both sides).
- Unscrew nut (right-side) -1- and detach bracket with electrical wiring from subframe.

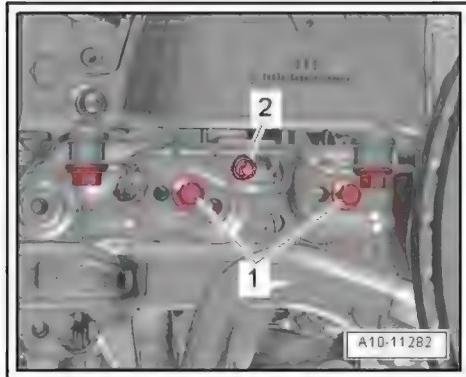


- Remove bolt -2- for engine mounting on both sides.

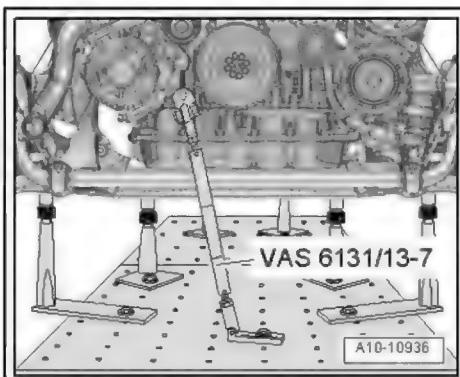


Note

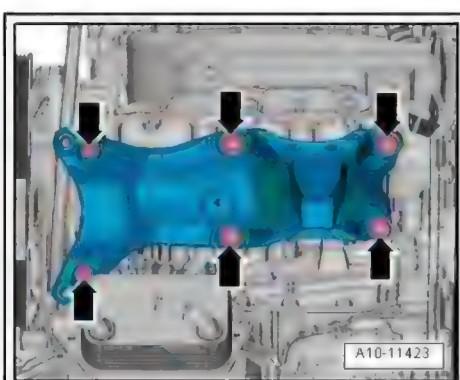
Disregard -item 1-.



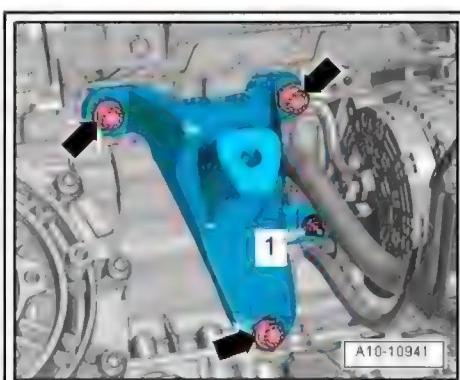
- Remove support -VAS 6131/13-7- from engine.
- Lift engine off engine cross member.



- Remove bolts -arrows- and detach engine support (left-side) with bracket for air conditioner compressor.



- Remove nut -1- and move earth wire clear at engine support.
- Unscrew bolts -arrows- and remove engine support (right-side).
- Tie up starter on engine.



- Secure engine with universal mounting - VAS 6095/1- and support bracket for V6 FSI engine, Audi A6 - VAS 6095/1-5- to engine and gearbox support - VAS 6095- as shown in illustration and tighten to 40 Nm.



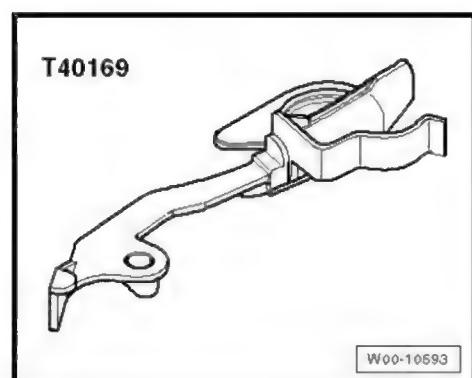
1.4 **Installing engine**

Special tools and workshop equipment required

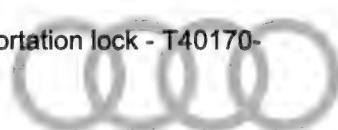
- ◆ Ring spanner insert AF 16 - V.A.G 1332/14-



- ◆ Assembly aid - T40169- for vehicles with 7-speed dual clutch gearbox 0B5



- ◆ Transportation lock - T40170-



Приемлемые затяжки для резьбы с дополнительным
 смазыванием маслом, авторизованы Audi AG. Audi AG оставляет за
 собой право отказать в гарантии в случае неправильной затяжки.



Tightening torques



- ◆ *Tightening torques apply only to lightly greased, oiled, phosphated or black-finished nuts and bolts.*
- ◆ *Additional lubricants such as engine or gear oil may be used, but do not use lubricants containing graphite.*
- ◆ *Do not use de-greased parts.*
- ◆ *Tolerance for tightening torques: ± 15 %.*

Component	Nm	
Bolts/nuts	M6	9
	M7	15

Component	Nm
M8	20
M10	40
M12	65

- ◆ Assembly mountings ⇒ [“2.1 Exploded view - assembly mountings”, page 58](#)
- ◆ Engine to gearbox ⇒ Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox / ⇒ Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox

Procedure



Note

- ◆ Renew the bolts tightened with specified tightening angle.
- ◆ Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.
- ◆ Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#).
- ◆ To ensure that the air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.
- ◆ Fit all cable ties in the original positions when installing.
- Engine with subframe positioned on scissor-type assembly platform - VAS 6131 B-
- Engine secured with support -VAS 6131/13-7- .
- Install engine supports and engine mountings ⇒ [page 58](#) .
- Before installing gearbox, always clean threaded holes for engine/gearbox bolts in cylinder block using a thread tap.
- The following preparations are required before joining engine and gearbox:

Vehicles with 7-speed dual clutch gearbox 0B5:

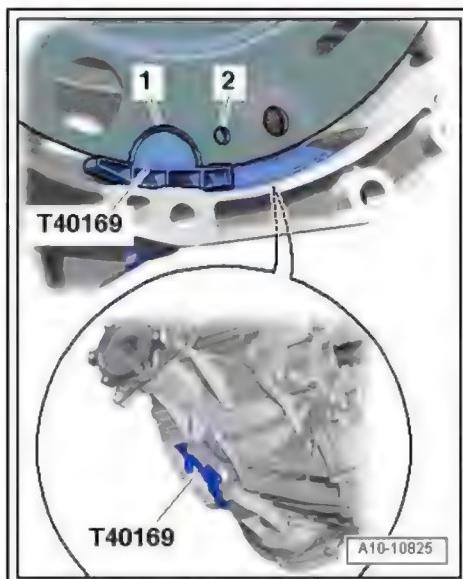
- Insert assembly aid - T40169- into gearbox housing between dual-mass flywheel and gearbox housing from below, as illustrated.
- The assembly aid must engage in the semi-circular recess -1- and in the inspection hole -2-.



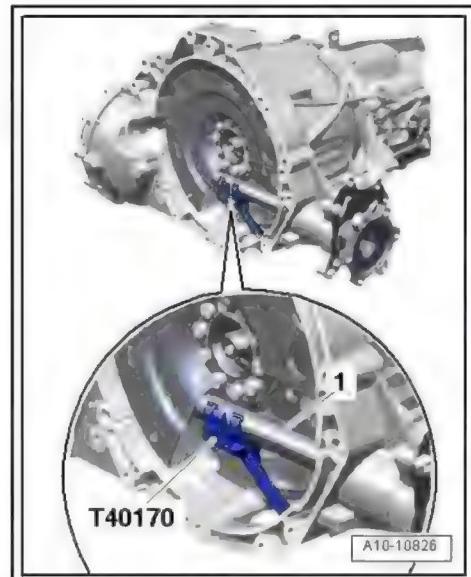
Note

There is only one inspection hole on the circumference; turn the dual-mass flywheel accordingly.

- Insert pin of assembly aid into hole on gearbox housing.

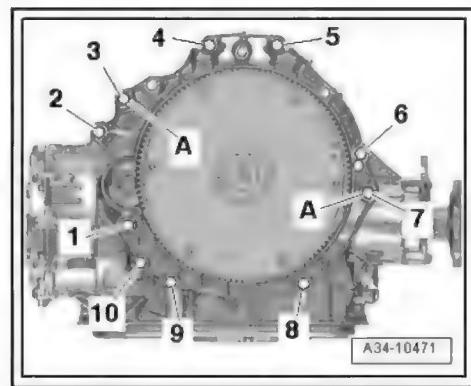


- Insert transport lock - T40170- into gearbox housing and dual-mass flywheel from below and clamp onto flange shaft -1-.



A10-10826

- Check whether aluminium bolts securing engine to gearbox can be reused; if so, apply marking ⇒ Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox .
- Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
- Bring gearbox into position on engine and tighten bolts -1, 6 ... 10-.
- Remove transport lock - T40170- and assembly aid - T40169- .



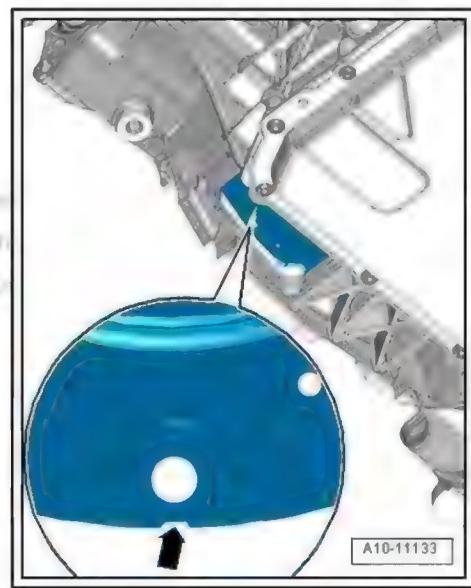
A34-10471

Vehicles with 8-speed automatic gearbox 0BK:

- Turn torque converter until hole is visible next to notch -arrow- in recess in bottom of gearbox housing, as shown in illustration.

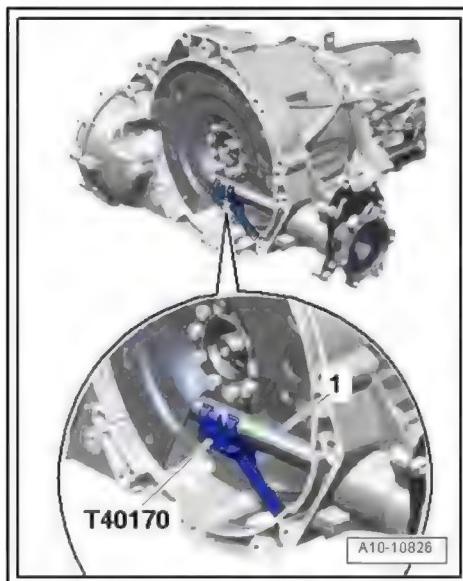


Note
 There is only one notch on the circumference; turn the torque converter accordingly.

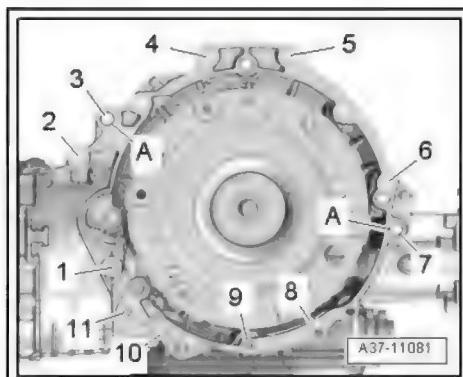


A10-11133

- Insert transportation lock - T40170- into gearbox housing from below and clamp onto flange shaft -1-.
- Hold ATF lines in installation position when joining engine and subframe.



- Check whether aluminium bolts securing engine to gearbox can be reused; if so, apply marking ⇒ Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox .
- Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
- Bring gearbox into position on engine (pay attention to starter).
- Tighten bolts -1 ... 11-.
- Remove transport lock - T40170- .



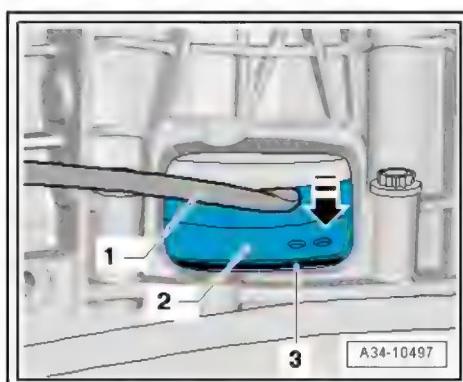
All vehicles (continued):



Note

The following step is necessary to ensure that the dual-mass flywheel/torque converter is straight and that it makes even contact with the drive plate.

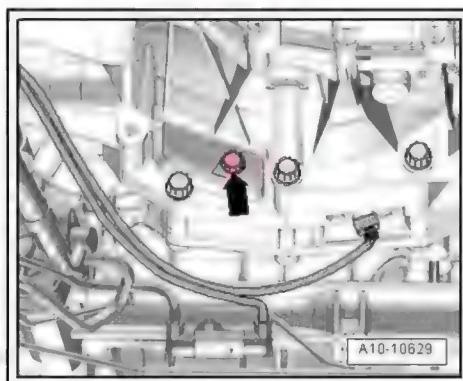
- Use assembly lever -1- to press dual-mass flywheel//torque converter -2- slightly against drive plate -3- in direction of -arrow-.
- Bolt dual-mass flywheel/torque converter onto drive plate as follows:



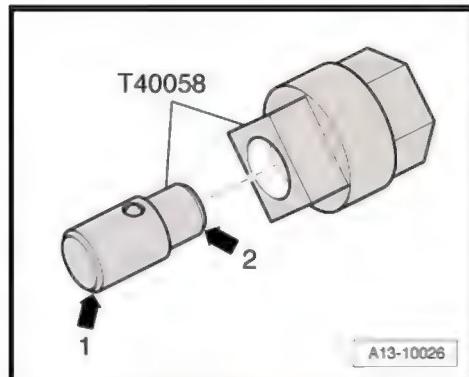
Note

Use ring spanner insert AF 16 - V.A.G 1332/14- to tighten bolts.

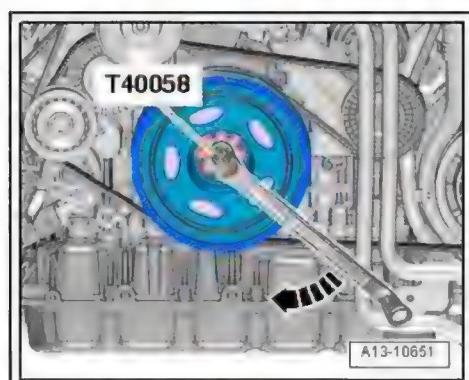
- Screw in first bolt -arrow- hand-tight (2 Nm).



- Insert guide pin of adapter -T40058- as follows:
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.

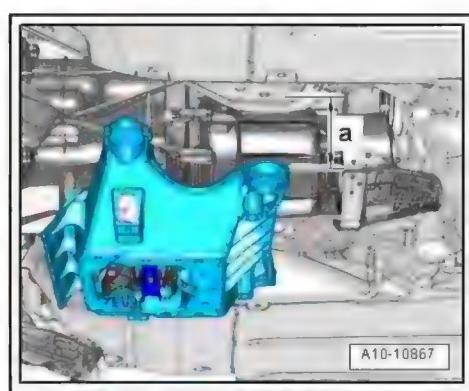


- Use adapter - T40058- and angled ring spanner to turn crankshaft 180° further in direction of engine rotation -arrow-.
- Now tighten bolt accessible in this position to specified torque
 ⇒ Rep. gr. 30 ; Clutch; Exploded view - flywheel and dual clutch / ⇒ Rep. gr. 32 ; Torque converter; Exploded view - torque converter .
- Turn crankshaft by 60° each time and tighten remaining 5 bolts to specified torque ⇒ Rep. gr. 30 ; Clutch; Exploded view - flywheel and dual clutch / ⇒ Rep. gr. 32 ; Torque converter; Exploded view - torque converter .
- Install ATF cooler ⇒ Rep. gr. 34 ; ATF circuit; Removing and installing ATF cooler / ⇒ Rep. gr. 37 ; ATF circuit; Removing and installing ATF cooler .
- Install drive shafts and heat shield for drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft .
- Install catalytic converters: left-side ⇒ [page 334](#) , right-side ⇒ [page 337](#) .



Vehicles with 7-speed dual clutch gearbox 0B5:

- Raise engine/gearbox assembly using scissor-type assembly platform - VAS 6131 B- only until distance between subframe and body is -a-.
- Dimension -a- = min. 100 mm.
- Install selector lever cable and adjust it if necessary ⇒ Rep. gr. 34 ; Selector mechanism; Removing and installing selector lever cable .
- Raise engine/gearbox assembly further using scissor-type assembly platform - VAS 6131 B- .



Vehicles with 8-speed automatic gearbox 0BK:

- Raise engine/gearbox assembly using scissor-type assembly platform - VAS 6131 B- .

All vehicles (continued):

- Align subframe and gearbox carrier on longitudinal members according to markings made before removal.
- Tighten subframe bolts only to specified torque (do not turn further); the bolts should only be fully tightened after performing the wheel alignment check ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .



WARNING

Risk of accident if bolted connections are loose.

- ◆ *Do NOT drive the vehicle unless the subframe bolts have been tightened to their final torque.*

- Tighten bolts for tunnel cross-piece ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings / ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings .

Vehicles with 8-speed automatic gearbox 0BK:

- Install selector lever cable and adjust it if necessary ⇒ Rep. gr. 37 ; Selector mechanism; Removing and installing selector lever cable .

All vehicles (continued):

Remaining installation steps are carried out in reverse sequence; note the following:

- Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .
- Install propshaft ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .
- Install front silencers ⇒ [page 326](#) .
- Align the exhaust system so it is free of stress ⇒ [page 331](#) .
- Install upper suspension links and suspension strut ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links .
- Install subframe cross brace and anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
- Install brake calipers ⇒ Brake system; Rep. gr. 46 ; Front brakes; Removing and installing brake caliper .
- Install front longitudinal member (bottom) ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .
- Install engine control unit ⇒ [page 324](#) .
- Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Exploded view - windscreen washer system .
- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install electrical wiring, terminal 30 wiring junction 2 - TV22- and cover for electronics box in engine compartment ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronic boxes; Overview of fitting locations - relay carriers, fuse carriers, electronic boxes .
- Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links .
- Install refrigerant lines ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Exploded view - condenser .
- Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .



Caution

Risk of irreparable damage to control units because of excessive voltage.

- ◆ *Never use battery charging equipment for boost starting.*

- Install air cleaner housing ⇒ [page 295](#) .
- Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .
- Install front longitudinal member (bottom) ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 411 .
- Connect coolant hose with plug-in connector ⇒ [page 240](#) .



Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 207](#) .
- Charge refrigerant system ⇒ Air conditioner with refrigerant R134a .
- Install wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
- Fit front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .
- Check wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheel alignment check; Wheel alignment procedure .



WARNING

Risk of accident if bolted connections are loose.

- ◆ *Tighten subframe bolts to final setting after performing wheel alignment check.*

- Install noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

2 Assembly mountings

⇒ "2.1 Exploded view - assembly mountings", page 58

⇒ "2.2 Supporting engine in installation position", page 60

⇒ "2.3 Removing and installing engine mountings", page 61

⇒ "2.4 Removing and installing gearbox mounting", page 64

2.1 Exploded view - assembly mountings

Engine mounting

1 - Engine mounting

- Depending on version, left side may include left electrohydraulic engine mounting solenoid valve - N144-
- Depending on version, right side may include right electrohydraulic engine mounting solenoid valve - N145-
- Removing and installing
⇒ "2.3 Removing and installing engine mountings", page 61

2 - Bolt

- 20 Nm

3 - Retaining plate

- For engine mounting
- When renewing engine mounting, also renew retaining plate

4 - Bolt

- 40 Nm

5 - Bolt

- 20 Nm

6 - Engine support

- Left-side: with bracket for air conditioner compressor

7 - Heat shield

8 - Bolt

- 10 Nm

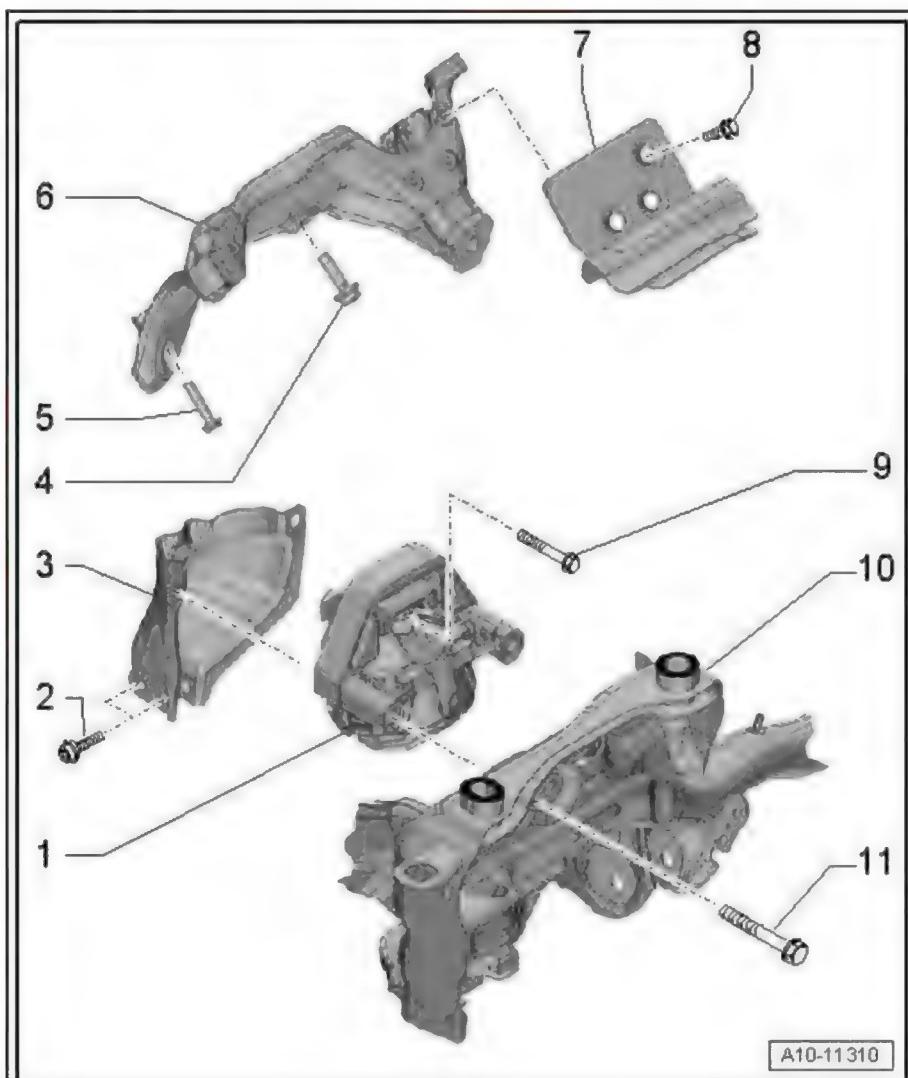
9 - Bolt

- Renew
- 90 Nm +90°

10 - Subframe

11 - Bolt

- 55 Nm



Gearbox mounting for dual clutch gearbox 0B5

1 - Bolt

- Tightening torque ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

2 - Tunnel cross member

- Removing and installing ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

Authorised by A
authorised to connect to the correctn

3 - Stop

- For gearbox mounting

4 - Gearbox mounting

- Removing and installing ⇒ ["2.4.2 Removing and installing gearbox mounting - vehicles with dual clutch gearbox"](#), page 65

5 - Bolt

- Tightening torque ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

6 - Nut

- Tightening torque ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

7 - Bolt

- Tightening torque ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

8 - Gearbox support

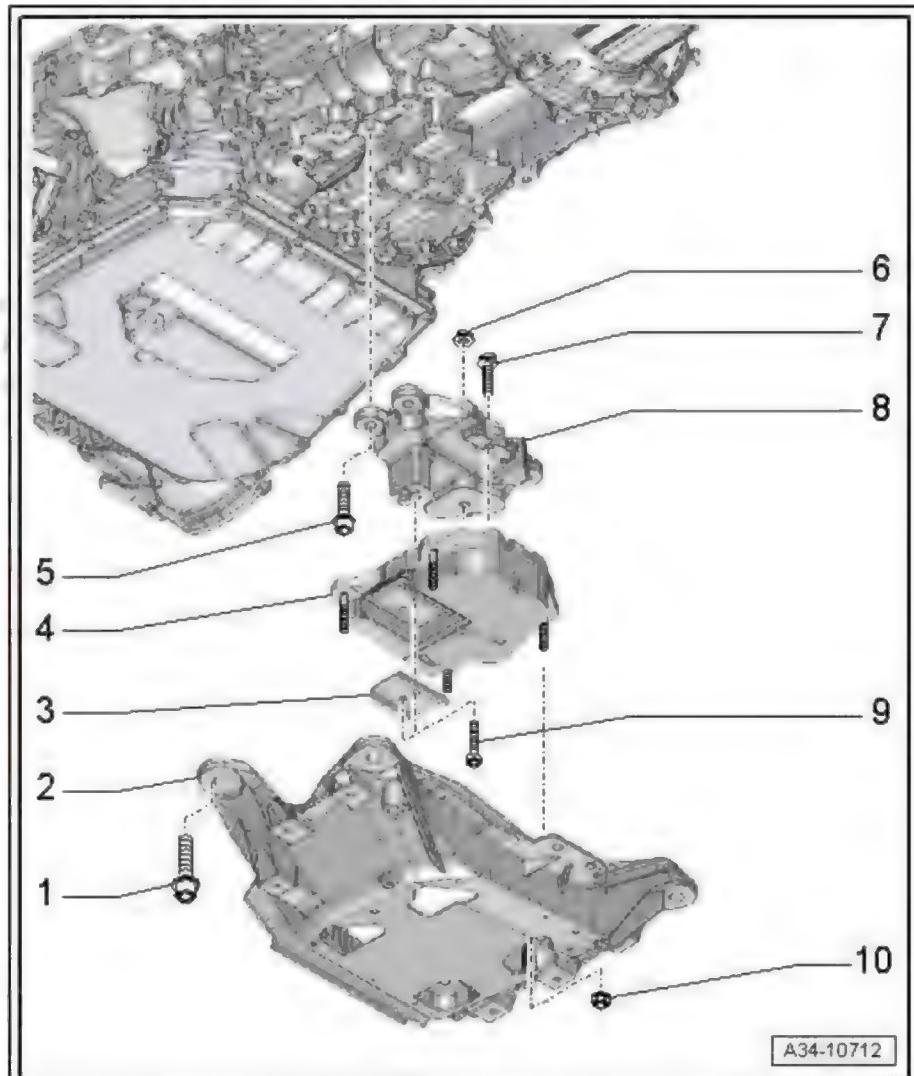
- Removing and installing ⇒ ["2.4.1 Removing and installing gearbox support with gearbox mounting - vehicles with dual clutch gearbox"](#), page 64

9 - Bolt

- Tightening torque ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

10 - Nut

- Tightening torque ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings



A34-10712

Gearbox mounting for automatic gearbox 0BK

1 - Bolt

- Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

2 - Tunnel cross member

- Removing and installing ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

3 - Stop

- For gearbox mounting

4 - Gearbox mounting

- Removing and installing ⇒ ["2.4.4 Removing and installing gearbox mounting - vehicles with automatic gearbox", page 66](#)

5 - Bolt

- Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

6 - Nut

- Only remove if detaching gearbox mounting from gearbox support
- Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

7 - Bolt

- Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

8 - Gearbox support

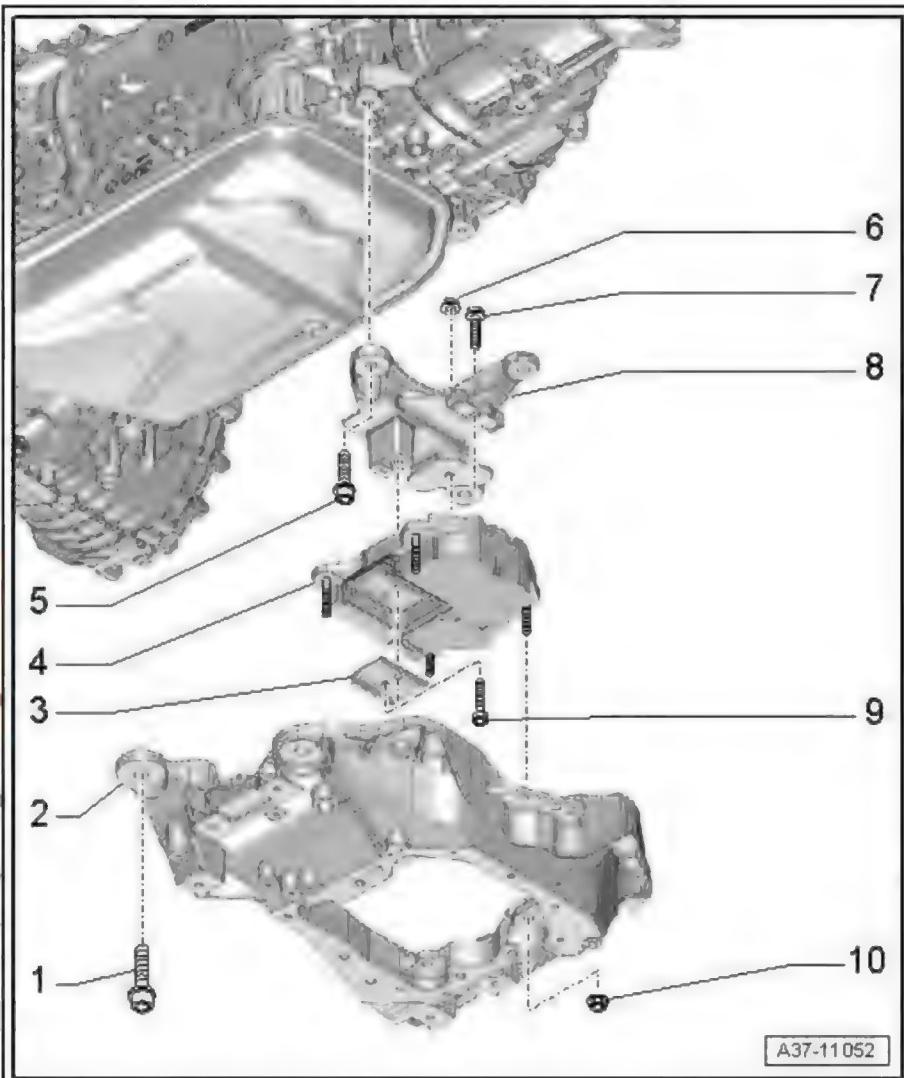
- Removing and installing ⇒ ["2.4.3 Removing and installing gearbox support with gearbox mounting - vehicles with automatic gearbox", page 65](#)

9 - Bolt

- Only remove if detaching gearbox mounting from gearbox support
- Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

10 - Nut

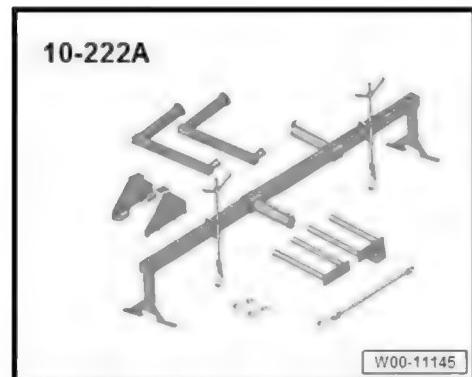
- Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings



2.2 Supporting engine in installation position

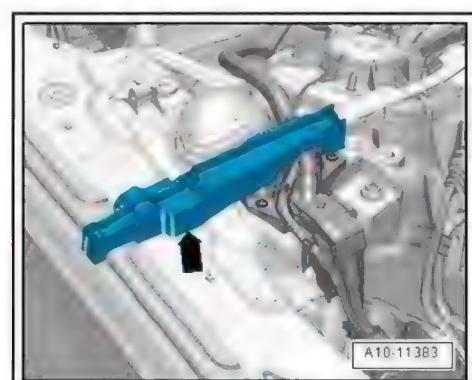
Special tools and workshop equipment required

- ◆ Support bracket - 10-222A-



Procedure

- Pull off foam wedge -arrow- (left and right) upwards.



- Set up support bracket - 10-222A- on suspension turrets (left and right) as illustrated.
- Engage spindles -10-222A/11- at engine lifting eyes (left and right).
- Partly take up weight of engine with spindles.



2.3 Removing and installing engine mountings



Note

- ◆ *To avoid repeat repairs, proceed as follows if an engine mounting is defective:*
 - ◆ *Renew engine mounting and corresponding retaining plate.*

Special tools and workshop equipment required

- Used oil collection and extraction unit - VAS 6622A-

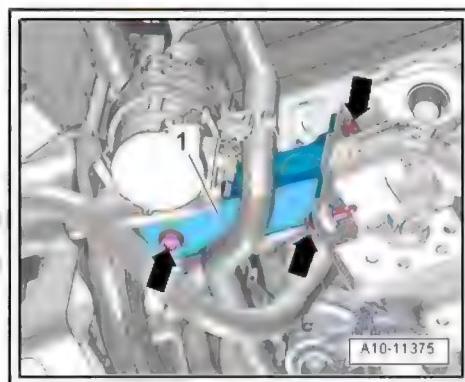


Removing

- Support engine in installation position ["2.2 Supporting engine in installation position", page 60](#).
- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Remove relevant front wheel spoiler ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
- Remove bolts -arrows- and detach longitudinal member (bottom front) -1- on relevant side.

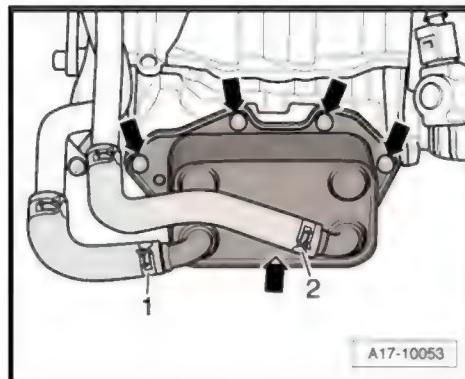


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Engine mounting (left-side):

- Position used oil collection and extraction unit - VAS 6622A- below engine.
- Remove bolts -arrows- and tie up engine oil cooler to one side with coolant hoses -1, 2- attached.

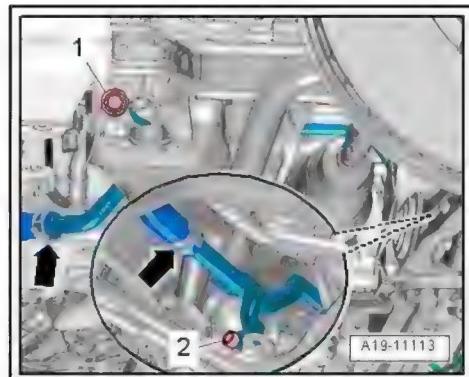


- Remove bolts -1 and 2- and press coolant pipe (bottom left) to the side.



Note

Disregard -arrows-

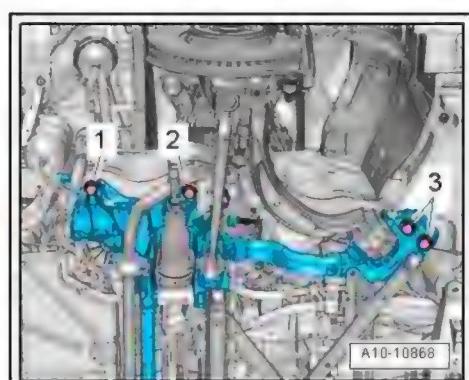


- Remove bolt -2- for subframe (left-side).



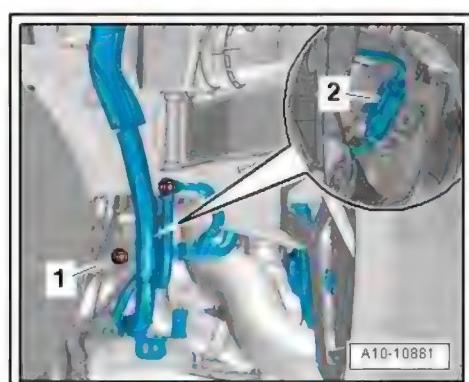
Note

Bolts -1- and -3- on left side and all bolts for subframe on right side remain fitted.



Engine mounting (right-side):

- Unscrew nut -1- and detach bracket with electrical wiring from subframe.



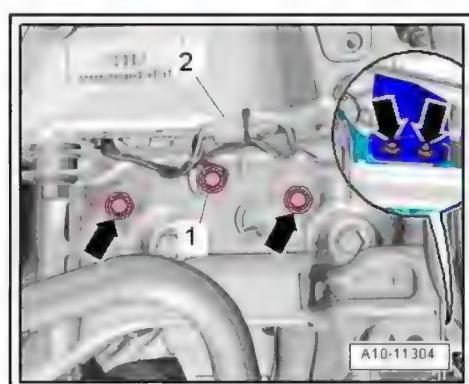
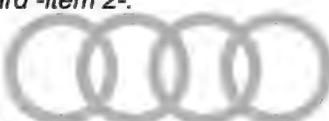
Both sides (continued):

- Take relevant electrical connector -2- for electrohydraulic engine mounting solenoid valve out of bracket and unplug connector.
- Remove bolts -1- and -arrows- and place relevant retaining plate to one side.



Note

Disregard -item 2-



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- Using spindle - 10-222A/11- -item 1-, raise engine through distance -a- on corresponding side.
- Distance -a- = approx. 20 mm.
- Detach engine mounting on relevant side.

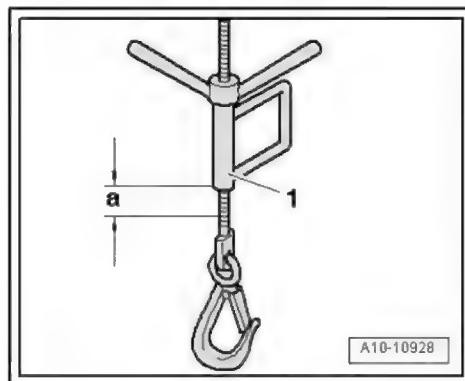
Installing

Installation is carried out in reverse order; note the following:



Note

Renew the bolts tightened with specified tightening angle.



- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install coolant pipe (bottom left) ⇒ [page 226](#).
- Install engine oil cooler ⇒ [page 187](#).

Tightening torques

- ◆ ⇒ [“2.1 Exploded view - assembly mountings”, page 58](#)
- ◆ ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe
- ◆ ⇒ Longitudinal member (bottom front) ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation
- ◆ Wheel spoiler ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)

2.4 Removing and installing gearbox mounting

⇒ [“2.4.1 Removing and installing gearbox support with gearbox mounting - vehicles with dual clutch gearbox”, page 64](#)

⇒ [“2.4.2 Removing and installing gearbox mounting - vehicles with dual clutch gearbox”, page 65](#)

⇒ [“2.4.3 Removing and installing gearbox support with gearbox mounting - vehicles with automatic gearbox”, page 65](#)

⇒ [“2.4.4 Removing and installing gearbox mounting - vehicles with automatic gearbox”, page 66](#)

2.4.1 Removing and installing gearbox support with gearbox mounting - vehicles with dual clutch gearbox

Removing

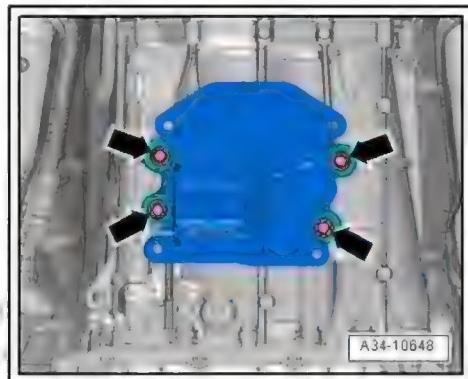
- Remove tunnel cross-piece ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings .
- Remove bolts -arrows- and detach gearbox support and gearbox mounting from gearbox.

Installing

Installation is carried out in reverse sequence.

Tightening torques

- ◆ ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings



2.4.2 Removing and installing gearbox mounting - vehicles with dual clutch gearbox

Removing

- Remove gearbox support with gearbox mounting ⇒ page 64 .
- Unscrew bolt -1- and detach stop -2- for gearbox mounting.
- Remove nut -5- and bolt -6- and detach gearbox mounting -3- from gearbox support -4-.

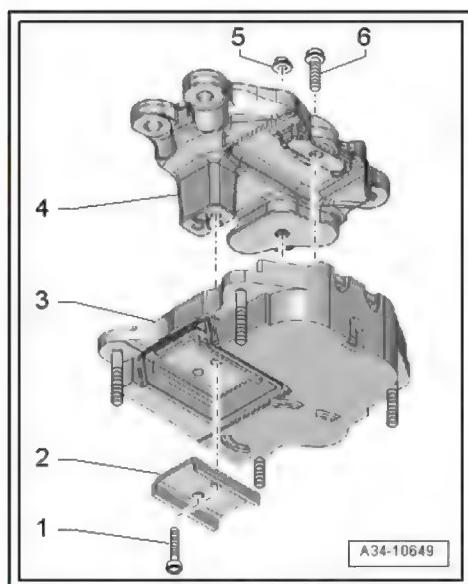
Installing

Installation is carried out in reverse order; note the following:

- Position gearbox support -4- on gearbox mounting -3-.
- Hand-tighten nut -5- and bolt -6-.
- Tighten bolt -1- for stop -2-.
- Tighten nut -5- and bolt -6-.
- Install gearbox support with gearbox mounting ⇒ page 64 .

Tightening torques

- ◆ ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings



2.4.3 Removing and installing gearbox support with gearbox mounting - vehicles with automatic gearbox

Removing

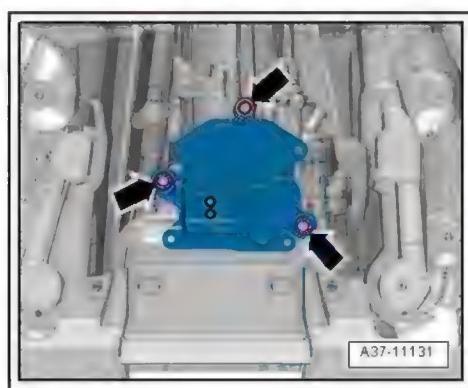
- Remove tunnel cross-piece ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings .
- Remove bolts -arrows- and detach gearbox support and gearbox mounting from gearbox.

Installing

Installation is carried out in reverse sequence.

Tightening torques

- ◆ ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings



2.4.4 Removing and installing gearbox mounting - vehicles with automatic gearbox

Removing

- Remove gearbox support with gearbox mounting [⇒ page 65](#).
- Unscrew bolt -1- and detach stop -2- for gearbox mounting.
- Remove nut -4- and bolt -5- and detach gearbox mounting -6- from gearbox support -3-.

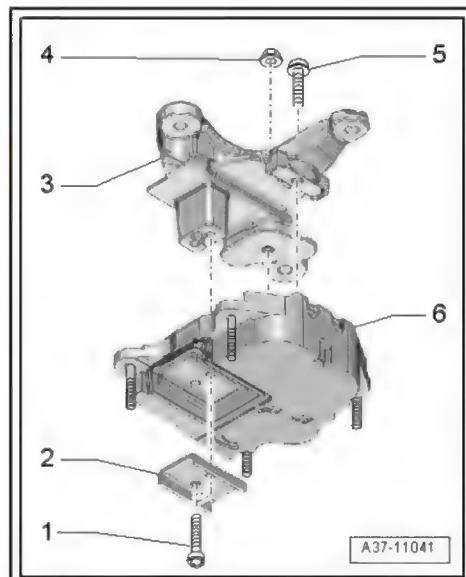
Installing

Installation is carried out in reverse order; note the following:

- Position gearbox support -3- on gearbox mounting -6-.
- Hand-tighten nut -4- and bolt -5-.
- Tighten bolt -1- for stop -2-.
- Tighten nut -4- and bolt -5-.
- Install gearbox support with gearbox mounting [⇒ page 65](#).

Tightening torques

- ◆ ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings



3 Engine cover panel

⇒ "3.1 Removing and installing engine cover panel", page
[67](#)

3.1 Removing and installing engine cover panel

Removing

- Pull off engine cover panel -1-/2- upwards.

Installing

- To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.
- Position engine cover panel on engine and use both hands to press it down into retaining clips.



13 – Crankshaft group

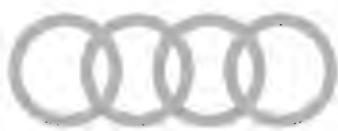
1 Cylinder block (pulley end)

- ⇒ “1.1 Exploded view - poly V-belt drive”, page 68
- ⇒ “1.2 Removing and installing poly V-belts”, page 71
- ⇒ “1.3 Removing and installing tensioner for poly V-belt”, page 75
- ⇒ “1.4 Removing and installing idler roller for poly V-belt”, page 77
- ⇒ “1.5 Removing and installing vibration damper”, page 78
- ⇒ “1.6 Removing and installing sealing flange (pulley end)”, page 80

1.1 Exploded view - poly V-belt drive

- ⇒ “1.1.1 Exploded view - poly V-belt drive, poly V-belt for supercharger”, page 68
- ⇒ “1.1.2 Exploded view - poly V-belt drive, poly V-belt for ancillaries”, page 69

1.1.1 Exploded view - poly V-belt drive, poly V-belt for supercharger



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1 - Poly V-belt

- For supercharger
- Check for wear
- Removing and installing
⇒ "1.2.1 Removing and installing poly V-belt for supercharger", page 71
- When installing, make sure it is properly seated on pulleys

2 - Bolt

- 40 Nm
- 37 Nm if using door alignment tool - 3320

3 - Washer

4 - Cover

5 - Supercharger

- Exploded view ⇒ "1.1 Exploded view - supercharger", page 257

6 - Idler roller

- For poly V-belt
- Removing and installing
⇒ "1.4.1 Removing and installing idler roller for supercharger", page 77

7 - Vibration damper

- With poly V-belt pulley
- Removing and installing
⇒ "1.5 Removing and installing vibration damper", page 78

8 - Bolt

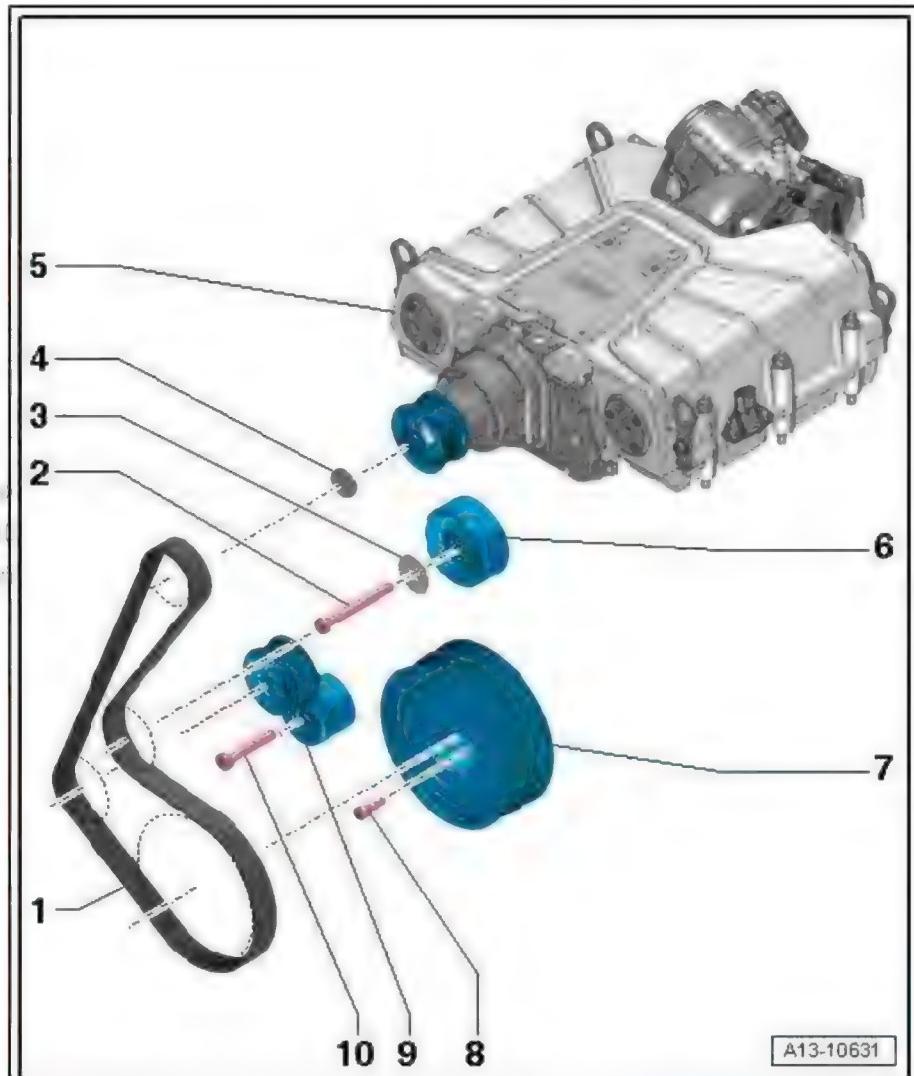
- Tightening torque ⇒ Item 17 (page 71)

9 - Tensioner

- For poly V-belt
- Removing and installing ⇒ "1.3.1 Removing and installing tensioner for poly V-belt for supercharger", page 75

10 - Bolt

- 40 Nm



1.1.2 Exploded view - poly V-belt drive, poly V-belt for ancillaries

1 - Poly V-belt

- Check for wear
- Before removing, mark direction of rotation with chalk or felt-tip pen
- Removing and installing
⇒ ["1.2.2 Removing and installing poly V-belt for ancillaries", page 73](#)
- Do not kink
- When installing, make sure it is properly seated on pulleys

2 - Alternator

- Removing and installing
⇒ Electrical system;
Rep. gr. 27 ; Alternator;
Removing and installing
alternator

3 - Bolt

- Tightening torque ⇒
Electrical system; Rep.
gr. 27 ; Alternator; Ex-
ploded view - alternator

4 - Idler roller

- For poly V-belt
- Removing and installing
⇒ ["1.4.2 Removing and installing idler roller for ancillaries", page 78](#)
- 40 Nm
- 37 Nm if using door
alignment tool - 3320-

5 - Bolt

- Tightening torque ⇒ [Item 2 \(page 213\)](#)

6 - Poly V-belt pulley

- For coolant pump
- Removing and installing ⇒ ["2.3 Removing and installing coolant pump", page 215](#)

7 - Bolt

- Tightening torque ⇒ [Item 1 \(page 213\)](#)

8 - Coolant pump

- Removing and installing ⇒ ["2.3 Removing and installing coolant pump", page 215](#)

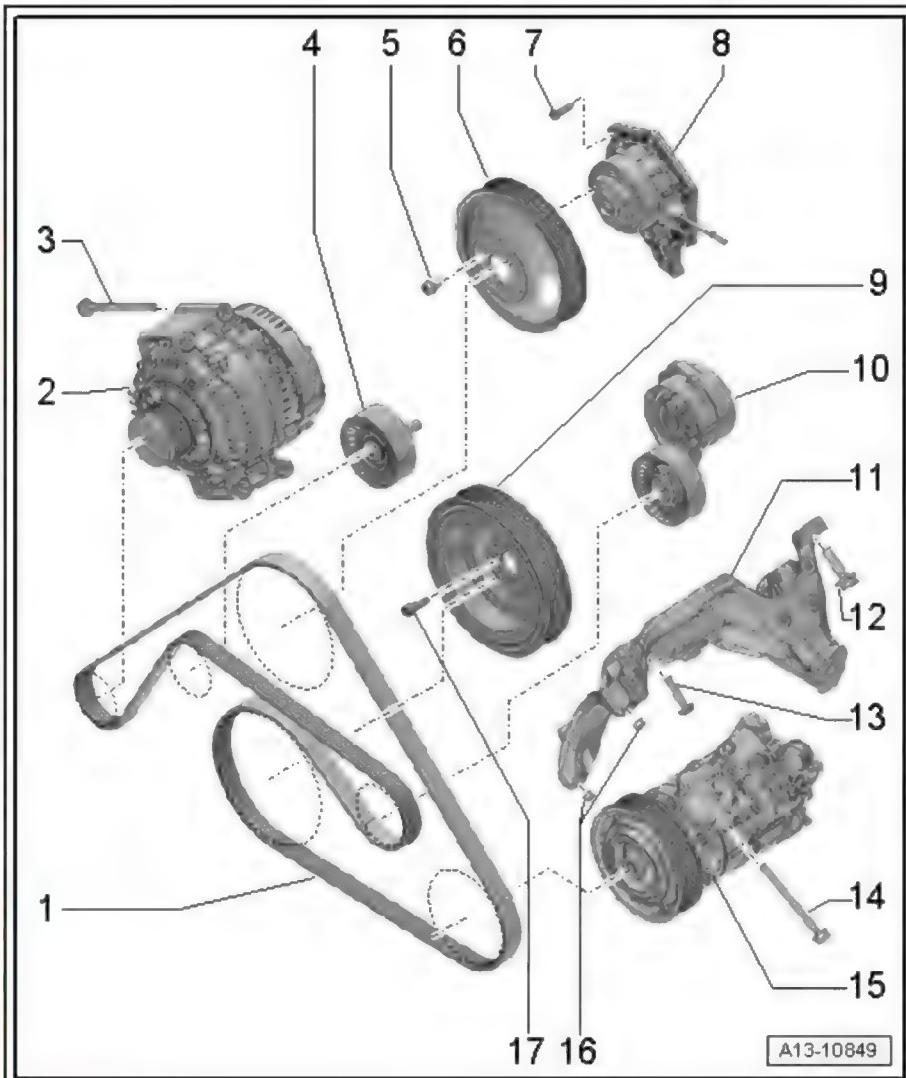
9 - Vibration damper

- With poly V-belt pulley
- Can only be installed in one position
- Removing and installing ⇒ ["1.5 Removing and installing vibration damper", page 78](#)

10 - Tensioner

- For poly V-belt
- Removing and installing
⇒ ["1.3.2 Removing and installing tensioner for poly V-belt for ancillaries", page 76](#)
- 40 Nm

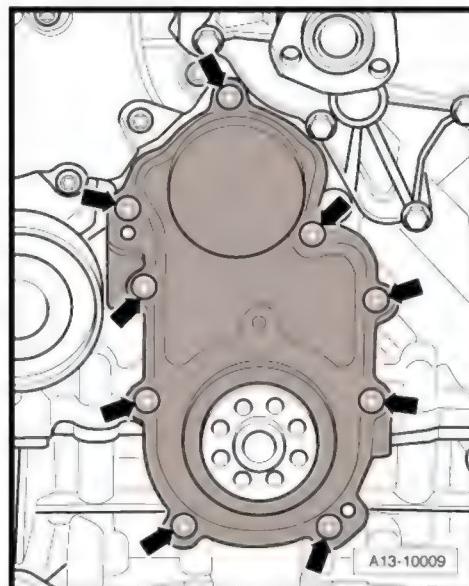
11 - Engine support (left-side)



- With bracket for air conditioner compressor
- 12 - Bolt
 - Tightening torque ⇒ [Item 4 \(page 58\)](#)
- 13 - Bolt
 - Tightening torque ⇒ [Item 5 \(page 58\)](#)
- 14 - Bolt
 - Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit
- 15 - Air conditioner compressor
 - Do not unscrew or disconnect refrigerant hoses or pipes.
 - Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket
- 16 - Dowel sleeves
- 17 - Bolt
 - Renew
 - 20 Nm +90°

Sealing flange (pulley end) - tightening torque and sequence

- Tighten bolts -arrows- in stages and in diagonal sequence; final torque 9 Nm.



1.2 Removing and installing poly V-belts

⇒ ["1.2.1 Removing and installing poly V-belt for supercharger", page 71](#)

⇒ ["1.2.2 Removing and installing poly V-belt for ancillaries", page 73](#)

1.2.1 Removing and installing poly V-belt for supercharger

Special tools and workshop equipment required



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- ◆ Locking pin - T10060 A-



W00-11211

Removing



WARNING

Risk of injury as the radiator fans may start up automatically.

- ◆ Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.

- Remove engine cover panel (front) ⇒ "3.1 Removing and installing engine cover panel", page 67 .
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

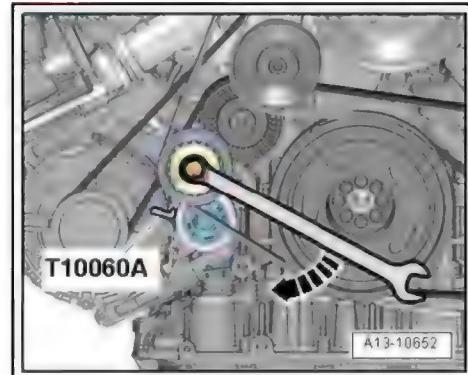


Caution

Running a used poly V-belt in the opposite direction could cause irreparable damage.

- ◆ Before removing the poly V-belt, mark the direction of rotation with chalk or a felt-tip pen for re-installation.

- Move tensioner in clockwise direction -arrow- to slacken poly V-belt.
- Detach poly V-belt and lock tensioner with locking pin - T10060 A- .



Installing

Installation is carried out in reverse order; note the following:

- Fit poly V-belt on pulleys as shown in illustration:

- 1 - Tensioner
- 2 - Supercharger
- 3 - Idler roller
- 4 - Vibration damper



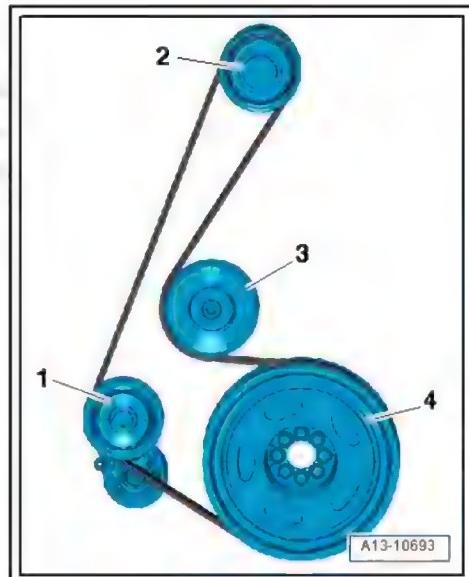
Note

When installing poly V-belt, make sure it is properly seated on pulleys.

- Start engine and check that poly V-belt(s) run properly.

Tightening torques

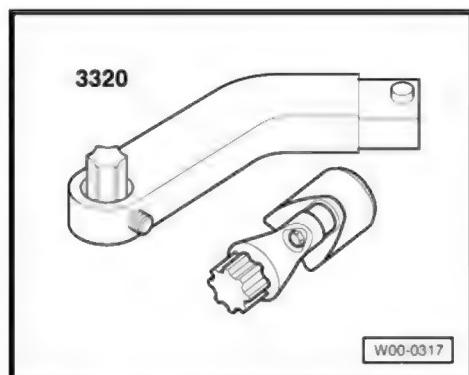
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation



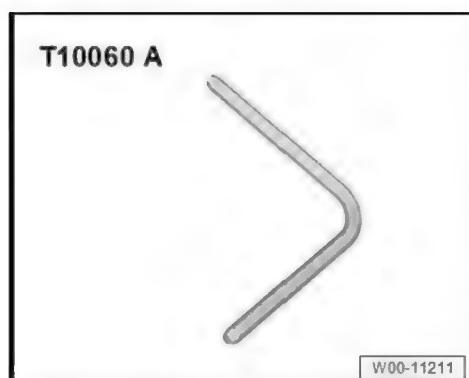
1.2.2 Removing and installing poly V-belt for ancillaries

Special tools and workshop equipment required

- ◆ Special wrench, long reach -3320/2- (included with door alignment tool - 3320-)



- ◆ Locking pin - T10060 A-



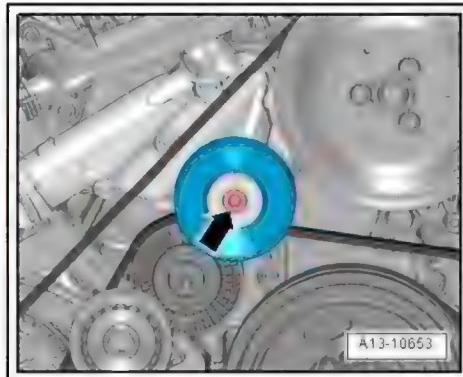
Removing

- Remove poly V-belt for supercharger ⇒ "1.2.1 Removing and installing poly V-belt for supercharger", page 71 .
- Remove bolt -arrow- using special wrench, long reach -3320/2- .
- Push guide roller towards radiator cowl.



Note

- ◆ Audi A7:
- ◆ *The guide roller cannot be detached.*

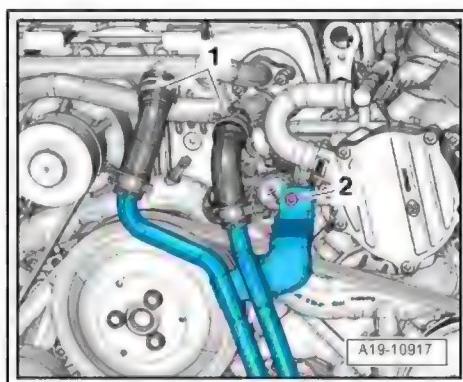


- Remove bolt -2- for coolant pipe (front left).



Note

- ◆ *For illustration purposes, the installation position is shown with the engine removed.*
- ◆ *Disregard -item 1-.*

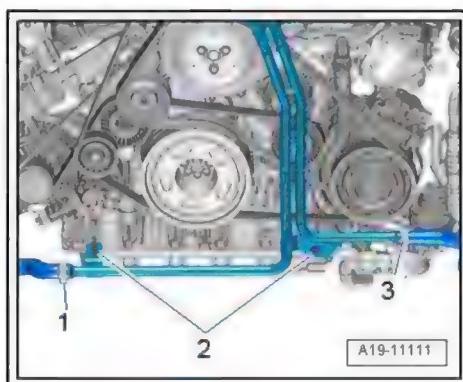


- Remove bolts -2- for coolant pipes (front left).



Note

- ◆ *For illustration purposes, the installation position is shown with the engine removed.*
- ◆ *Disregard items -1 and 3-.*

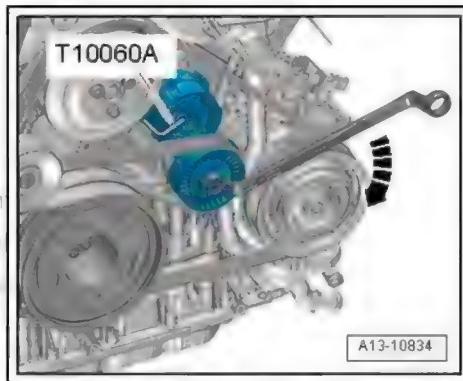


Caution

Running a used poly V-belt in the opposite direction could cause irreparable damage.

- ◆ *Mark direction of rotation of poly V-belt with chalk or felt-tip pen for re-installation.*

- To slacken poly V-belt, turn tensioner clockwise -arrow- and lock with locking pin - T10060 A- .
- Take off poly V-belt.

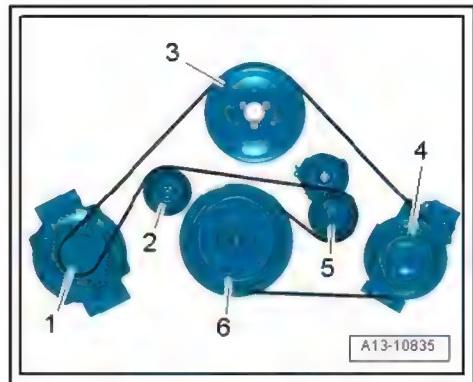


Installing

Installation is carried out in reverse order; note the following:

- Fit poly V-belt on pulleys as shown in illustration.

- 1 - Alternator
- 2 - Idler roller
- 3 - Coolant pump
- 4 - Air conditioner compressor
- 5 - Tensioner for poly V-belt
- 6 - Vibration damper



When installing poly V-belt, make sure it is properly seated on pulleys.

- Install coolant pipes (front left) ⇒ [“3.3.3 Removing and installing coolant pipes \(front left\)”, page 228](#).
- Install idler roller for supercharger ⇒ [“1.4.1 Removing and installing idler roller for supercharger”, page 77](#).
- Install poly V-belt for supercharger ⇒ [“1.2.1 Removing and installing poly V-belt for supercharger”, page 71](#).
- Start engine and check that poly V-belt(s) run properly.

Tightening torques

- ◆ ⇒ [“1.1.1 Exploded view - poly V-belt drive, poly V-belt for supercharger”, page 68](#)

1.3 Removing and installing tensioner for poly V-belt

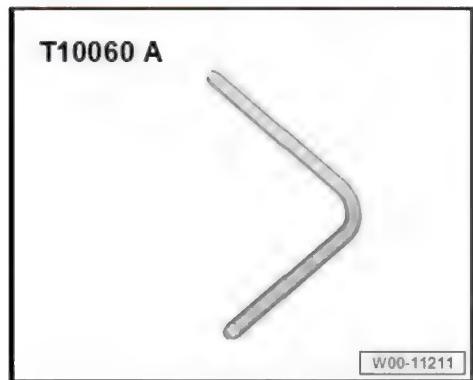
⇒ [“1.3.1 Removing and installing tensioner for poly V-belt for supercharger”, page 75](#)

⇒ [“1.3.2 Removing and installing tensioner for poly V-belt for ancillaries”, page 76](#)

1.3.1 Removing and installing tensioner for poly V-belt for supercharger

Special tools and workshop equipment required

- ◆ Locking pin - T10060 A-



Removing

- Remove poly V-belt for supercharger ⇒ ["1.2.1 Removing and installing poly V-belt for supercharger", page 71](#) .
- Remove bolt -1- and take off poly V-belt tensioner -2-.

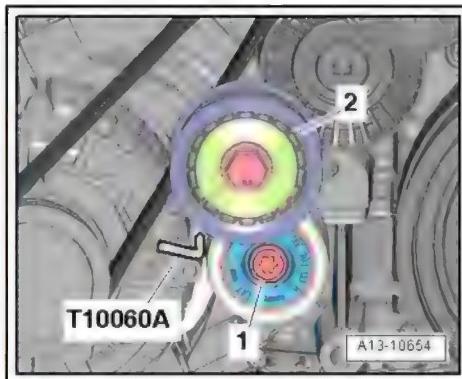
Installing

Installation is carried out in reverse order; note the following:

- Install poly V-belt for supercharger ⇒ ["1.2.1 Removing and installing poly V-belt for supercharger", page 71](#) .

Tightening torques

- ◆ ⇒ ["1.1.1 Exploded view - poly V-belt drive, poly V-belt for supercharger", page 68](#)



1.3.2 Removing and installing tensioner for poly V-belt for ancillaries

Removing



WARNING

Risk of injury as the radiator fans may start up automatically.

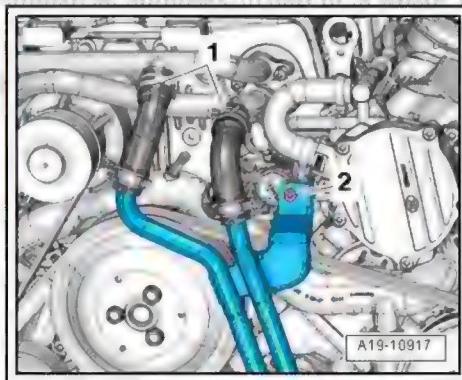
- ◆ Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.

- Remove engine cover panel (front) ⇒ ["3.1 Removing and installing engine cover panel", page 67](#) .
- Remove bolt -2- for coolant pipe (front left).



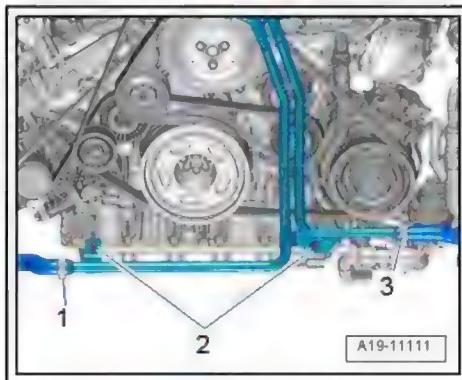
Note

- ◆ For illustration purposes, the installation position is shown with the engine removed.
- ◆ Disregard -item 1-.
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Remove bolts -2- for coolant pipes (front left).

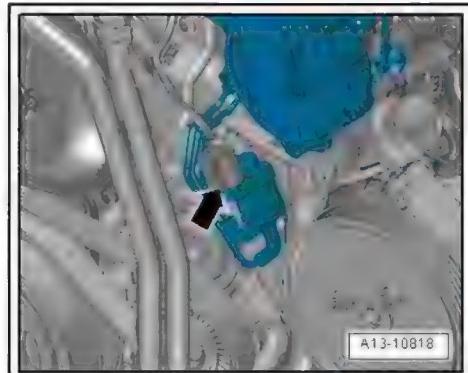


Note

- ◆ For illustration purposes, the installation position is shown with the engine removed.
- ◆ Disregard items -1 and 3-.



- Detach coolant valve for cylinder head - N489- -arrow- from bracket and move it clear to the side.

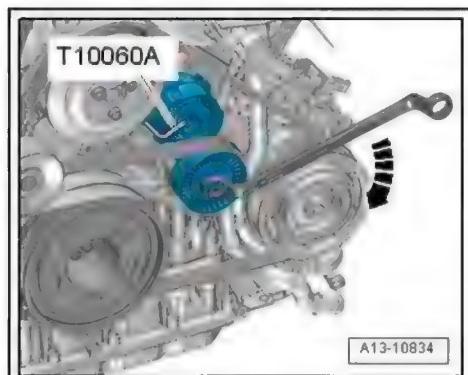


- Move tensioner in clockwise direction -arrow- to slacken poly V-belt.
- Remove poly V-belt from tensioner and release tensioner.



Note

Ignore -T10060 A- .



- Detach cover from tensioner.
- Remove bolt -1- and detach poly V-belt tensioner -2- from cylinder block.

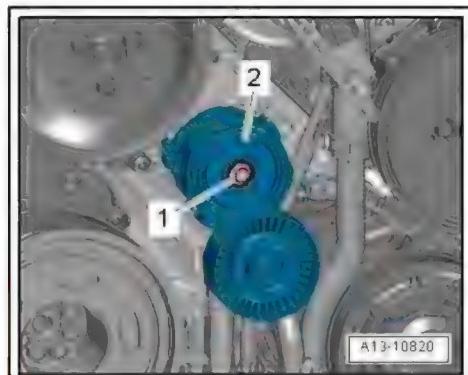
Installing

Installation is carried out in reverse order; note the following:

- Install poly V-belt [⇒ "1.2.2 Removing and installing poly V-belt for ancillaries", page 73](#).
- Install coolant pipes (front left) [⇒ "3.3.3 Removing and installing coolant pipes \(front left\)", page 228](#).

Tightening torques

- ◆ [⇒ "1.1.2 Exploded view - poly V-belt drive, poly V-belt for ancillaries", page 69](#)
- ◆ [⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation](#)



1.4 Removing and installing idler roller for poly V-belt

[⇒ "1.4.1 Removing and installing idler roller for supercharger", page 77](#)

[⇒ "1.4.2 Removing and installing idler roller for ancillaries", page 78](#)

1.4.1 Removing and installing idler roller for supercharger

Removing is permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

- Remove poly V-belt for supercharger [⇒ "1.2.1 Removing and installing poly V-belt for supercharger", page 71](#).

Audi A7

- Remove radiator cowl ⇒ ["4.5.2 Removing and installing radiator cowl - Audi A7", page 251](#).

All vehicles (continued)

- Remove bolt -arrow- and detach together with idler roller.

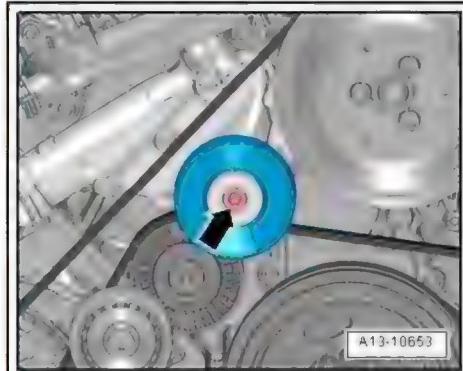
Installing

Installation is carried out in reverse order; note the following:

- Install poly V-belt for supercharger ⇒ ["1.2.1 Removing and installing poly V-belt for supercharger", page 71](#).
- Audi A7: Install radiator cowl ⇒ ["4.5.2 Removing and installing radiator cowl - Audi A7", page 251](#).

Tightening torques

- ◆ ⇒ ["1.1.1 Exploded view - poly V-belt drive, poly V-belt for supercharger", page 68](#)
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation



1.4.2 Removing and installing idler roller for ancillaries

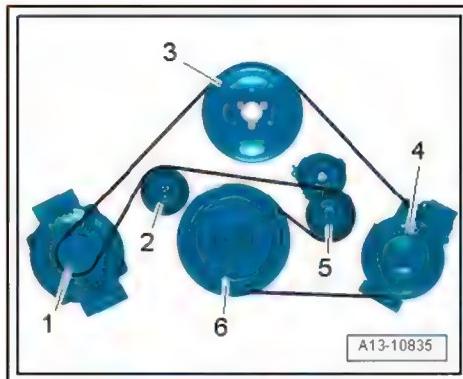
Removing

- Remove poly V-belt for supercharger ⇒ ["1.2.1 Removing and installing poly V-belt for supercharger", page 71](#).
- Remove poly V-belt tensioner for supercharger ⇒ ["1.3.1 Removing and installing tensioner for poly V-belt for supercharger", page 75](#).
- Remove idler roller for poly V-belt of supercharger ⇒ ["1.4.1 Removing and installing idler roller for supercharger", page 77](#).
- Unscrew bolt -2- and remove idler roller.

Installing

Installation is carried out in reverse order; note the following:

- ◆ ⇒ ["1.1.2 Exploded view - poly V-belt drive, poly V-belt for ancillaries", page 69](#)
- ◆ ⇒ ["1.1.1 Exploded view - poly V-belt drive, poly V-belt for supercharger", page 68](#)
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation



1.5 Removing and installing vibration damper

Special tools and workshop equipment required

◆ Counterhold tool - 3036-



Removing

- Remove poly V-belt for supercharger ⇒ ["1.2.1 Removing and installing poly V-belt for supercharger", page 71](#) .
- Remove bolt -2- for coolant pipes (front left).



- ◆ For illustration purposes, the installation position is shown with the engine removed.
- ◆ Disregard -item 1-.

- Remove bolts -2- for coolant pipes (front left).



Disregard items -1 and 3-.

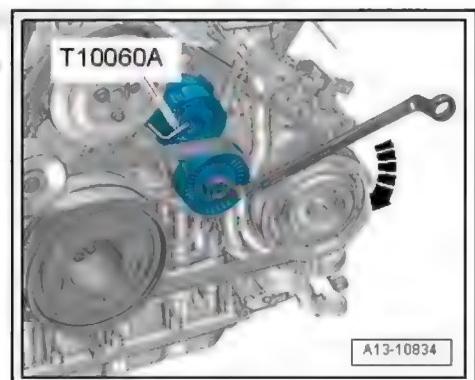
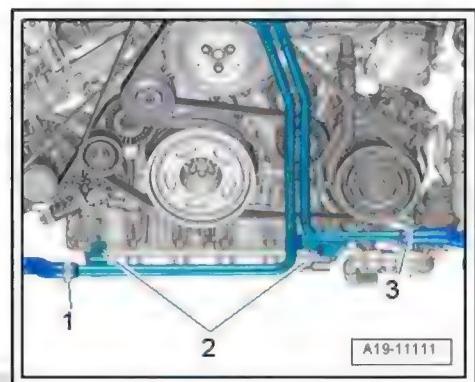
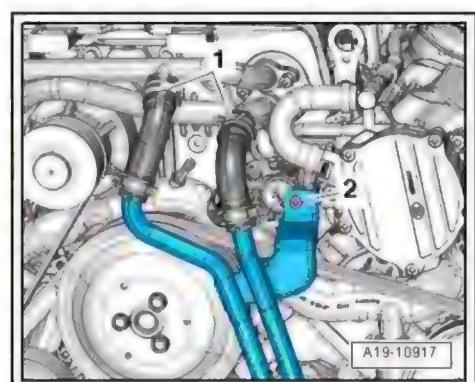


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- Move tensioner in clockwise direction -arrow- to slacken poly V-belt.
 with respect to the correctness of information!
- Remove poly V-belt from vibration damper and release tensioner.



Ignore -T10060 A- .



- Remove bolts -1- for vibration damper using counterhold tool - 3036- .
- Remove vibration damper.

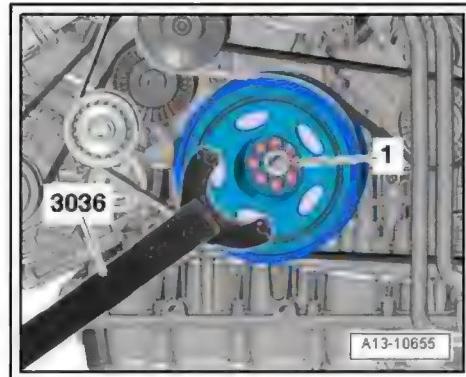
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ Renew the bolts tightened with specified tightening angle.
- ◆ Can only be installed in one position (holes are off-set)



- Install coolant pipes (front left) ⇒ ["3.3.3 Removing and installing coolant pipes \(front left\)", page 228](#) .
- Install poly V-belt ⇒ ["1.2.2 Removing and installing poly V-belt for ancillaries", page 73](#)

Tightening torques

- ◆ ⇒ ["1.1.2 Exploded view - poly V-belt drive, poly V-belt for ancillaries", page 69](#)

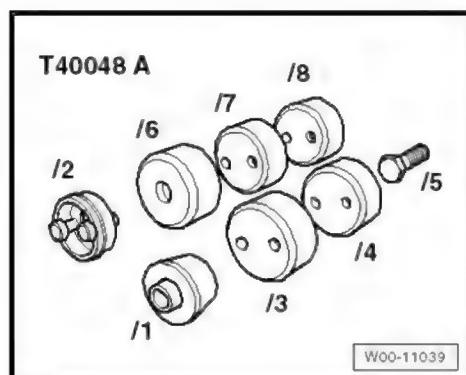
1.6 Removing and installing sealing flange (pulley end)

Special tools and workshop equipment required

- ◆ Pin wrench - 3212-



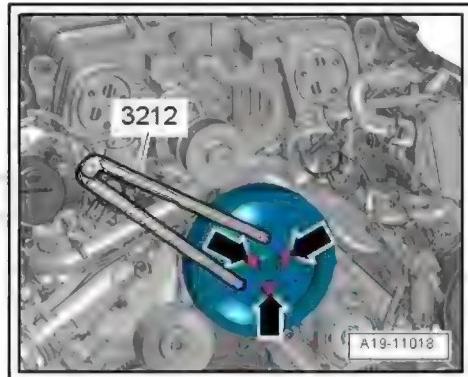
- ◆ Assembly tool - T40048A-



- ◆ Electric drill with plastic brush
- ◆ Safety goggles
- ◆ Sealant ⇒ Electronic parts catalogue

Procedure

- Remove poly V-belt [page 73](#).
- Remove vibration damper [page 78](#).
- Loosen bolts -arrows- for coolant pump pulley (counterhold with pin wrench -3212-).



- Remove bolts -arrows-.
- Release sealing flange (pulley end) from bonded joint and take off sealing flange.



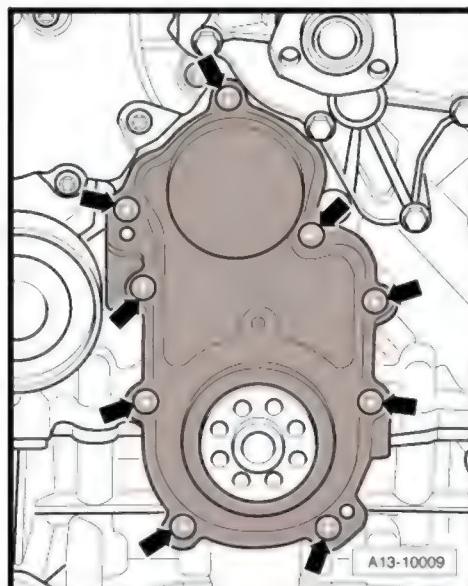
Renew sealing flange (pulley end).



Caution

Protect lubrication system against contamination.

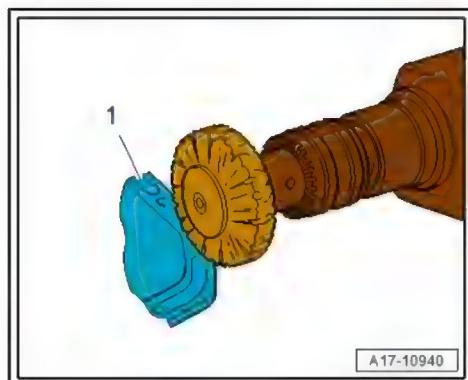
- ◆ Cover exposed parts of the engine.



WARNING

Risk of eye injury due to sealant residue.

- Put on safety goggles.

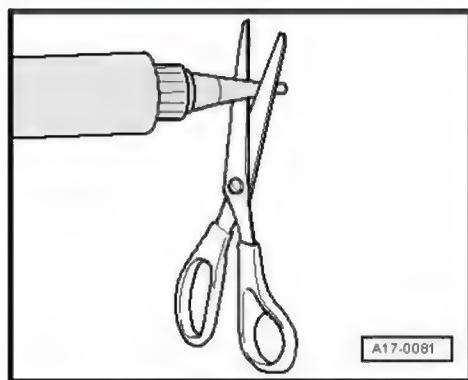


- Remove sealant residue from cylinder block and sump (top section) -1- using rotating plastic brush or similar.
- Clean surfaces; they must be free of oil and grease.



Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle Ø approx. 1.5 mm).





Caution

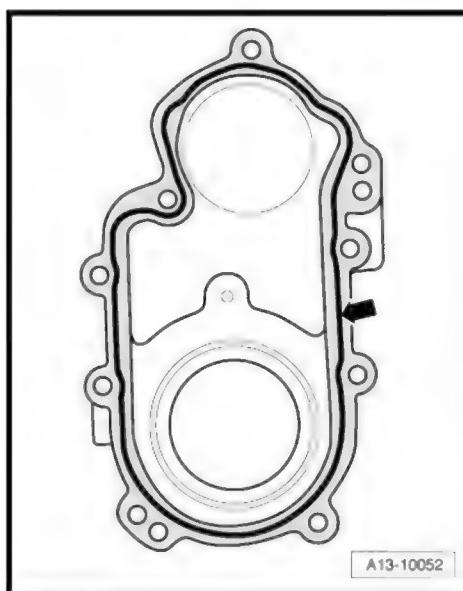
- Make sure lubrication system is not clogged by excess sealant.*
- ◆ *The sealant bead must not be thicker than specified.*

- Apply bead of sealant -arrow- onto sealing surface of new sealing flange (pulley end) as shown in illustration.
- The groove on the sealing surface must be completely filled with sealant.
- The bead of sealant must project 1.5 ... 2.0 mm above the sealing surface.



Note

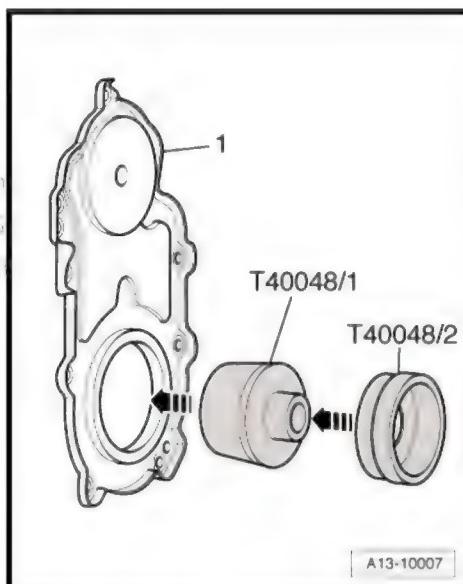
The sealing flange (pulley end) must be installed within 5 minutes after applying the sealant.



A13-10052

- Fit assembly aid -T40048/1- onto assembly sleeve -T40048/2- and slide sealing flange -1- onto assembly sleeve.
- Detach assembly aid.

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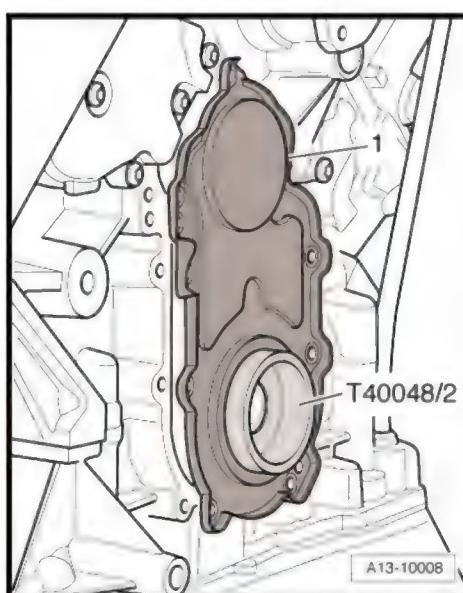


A13-10007

- First position sealing flange (with assembly sleeve -T40048/2- inserted) on crankshaft.
- Keep sealing flange straight while pushing it onto engine sealing surface. Then bolt on [page 71](#).

Remaining installation steps are carried out in reverse sequence; note the following:

- Install poly V-belt pulley for coolant pump [page 213](#).
- Install vibration damper [page 78](#).



A13-10008

2 Cylinder block (gearbox end)

⇒ "2.1 Exploded view - cylinder block (gearbox end)", page 83

⇒ "2.2 Removing and installing drive plate", page 84

⇒ "2.3 Removing and installing sender wheel", page 85

⇒ "2.4 Checking sender wheel", page 85

⇒ "2.5 Renewing crankshaft oil seal (gearbox end)", page 87

⇒ "2.6 Renewing needle bearing in drive plate", page 88

2.1 Exploded view - cylinder block (gearbox end)



Note

When performing assembly work, secure engine to engine and gearbox support - VAS 6095- ⇒ page 47 .

1 - Drive plate

- With bearing flange
- Check running surface on bearing flange and holes for clutch module for cracks and scoring.
- Removing and installing
⇒ "2.2 Removing and installing drive plate", page 84

2 - Bolt

- Renew
- 60 Nm +90°

3 - Needle bearing

- Installation position: closed side towards engine
- Removing and installing
⇒ "2.6 Renewing needle bearing in drive plate", page 88

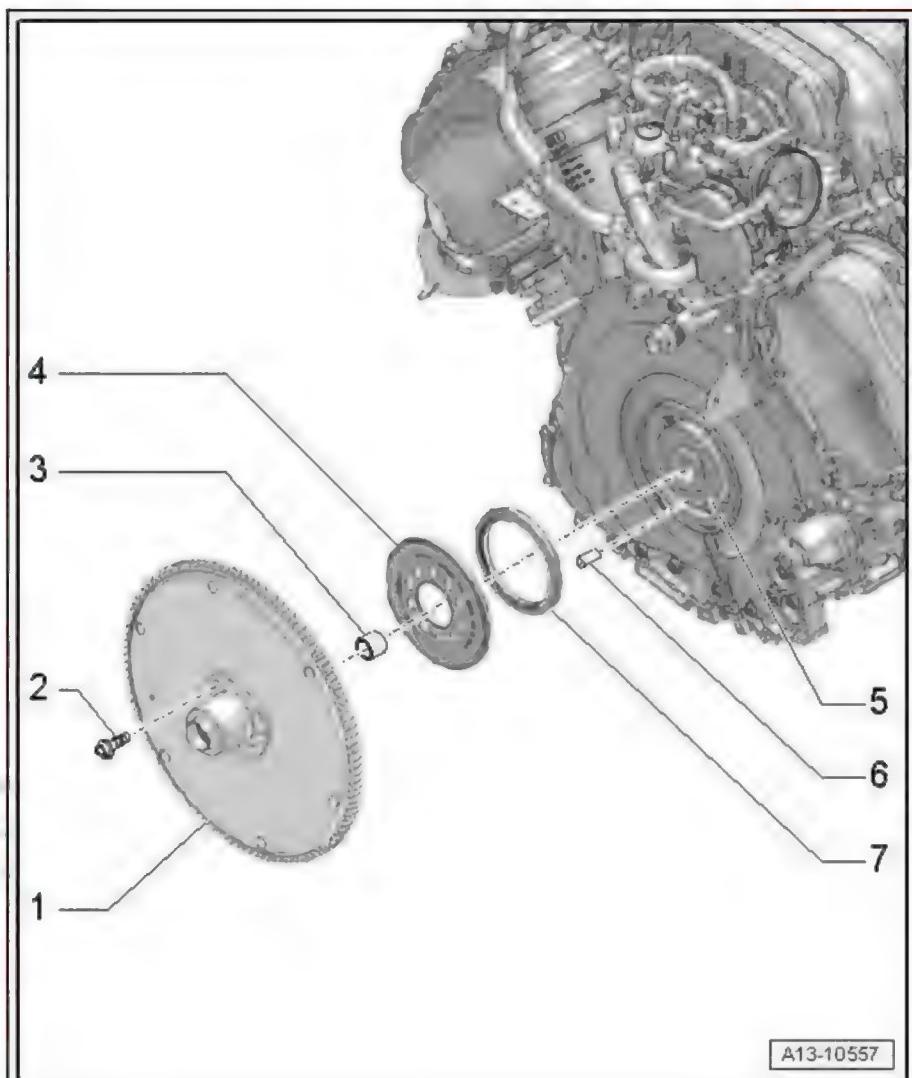
4 - Sender wheel

- For engine speed sender G28
- Removing and installing
⇒ "2.3 Removing and installing sender wheel", page 85
- Checking ⇒ "2.4 Checking sender wheel", page 85



Caution

Risk of magnetic fields causing irreparable damage to sender wheel.



A13-10557

The sender wheel must be kept away from magnets (e.g. base of torch, loudspeaker).

If the drive plate/flywheel or the sender wheel itself has been removed or renewed, check that the sender wheel is operating correctly before installation ⇒ "2.4 Checking sender wheel", page 85.

5 - Crankshaft

6 - Dowel pin

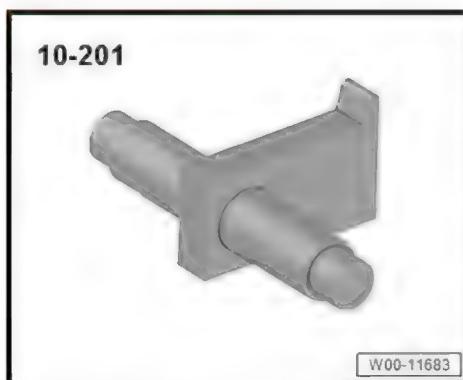
7 - Oil seal

- For crankshaft (gearbox end)
- Renewing ⇒ "2.5 Renewing crankshaft oil seal (gearbox end)", page 87

2.2 Removing and installing drive plate

Special tools and workshop equipment required

- ◆ Counterhold tool - 10 - 201-



Removing

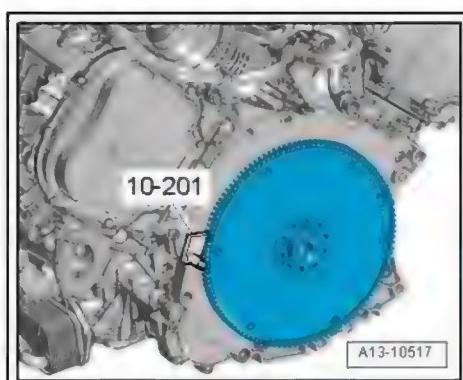
- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Insert counterhold tool - 10-201- to slacken bolts.



Caution

Take care not to damage outer surface of bearing flange on drive plate.

- ◆ Use a multi-point socket bit with a length of at least 40 mm to slacken and tighten the drive plate bolts.



- Remove bolts and take off drive plate and sender wheel.

Installing



Installation is carried out in reverse order; note the following:

Important by assembly: Paying the greatest attention to prevent damage to parts during assembly. In case of assembly, it must be observed that no damage is caused to the Audi original parts. Audi original parts must not be damaged in any way.



Note

Renew the bolts tightened with specified tightening angle.

- Pay attention to dowel pin when installing drive plate.
- Fit counterhold tool - 10-201- the other way round to tighten bolts.

Tightening torques

- ◆ ⇒ “2.1 Exploded view - cylinder block (gearbox end)”, page 83

2.3 Removing and installing sender wheel

Removing

- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove drive plate ⇒ page 84 .



Caution

Risk of magnetic fields causing irreparable damage to sender wheel.

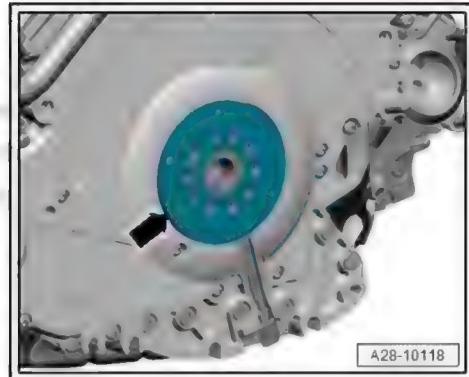
- ◆ The sender wheel must be kept away from magnets (e.g. base of torch, loudspeaker).
- ◆ If the drive plate/flywheel or the sender wheel itself has been removed or renewed, check that the sender wheel is operating correctly before installation ⇒ page 85 .

- Detach sender wheel -arrow-

Installing

Installation is carried out in reverse order; note the following:

- Install drive plate ⇒ page 84 .



2.4 Checking sender wheel

Special tools and workshop equipment required

◆ Sensor gauge - T10473-



Procedure

- Sender wheel removed

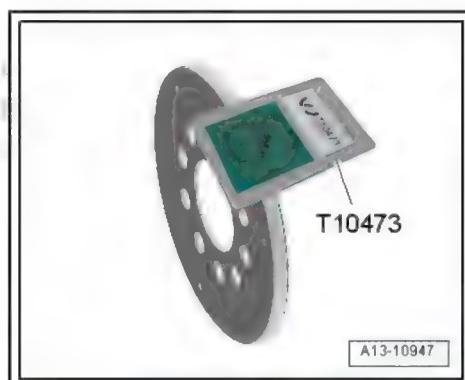


Caution

Risk of magnetic fields causing irreparable damage to sender wheel.

- ◆ The sender wheel must be kept away from magnets (e.g. base of torch, loudspeaker).
- ◆ If the drive plate/flywheel or the sender wheel itself has been removed or renewed, check that the sender wheel is operating correctly before installation.

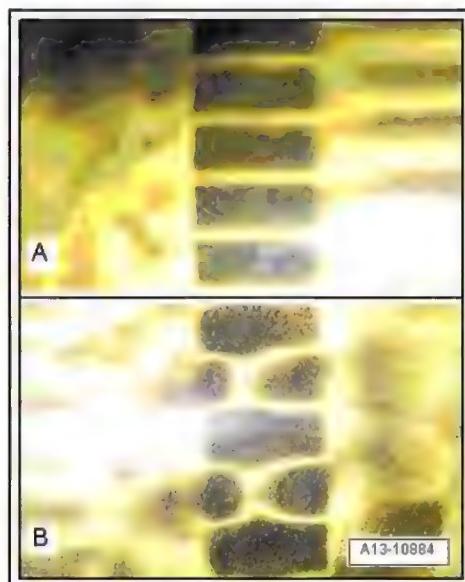
- Check entire circumference of sender wheel using sensor gauge - T10473-, as shown in illustration.



Inspection image of sender wheel

A - Sender wheel OK

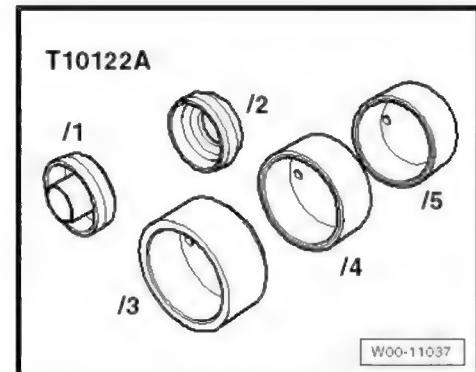
B - Sender wheel defective



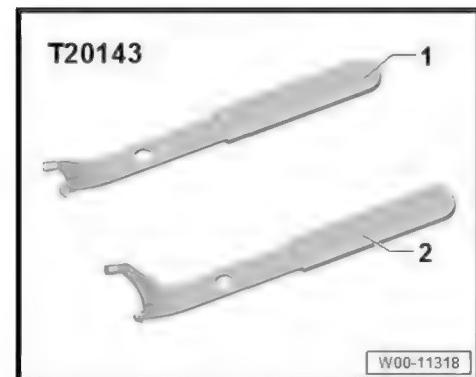
2.5 Renewing crankshaft oil seal (gearbox end)

Special tools and workshop equipment required

- ◆ Fitting tool - T10122 A-

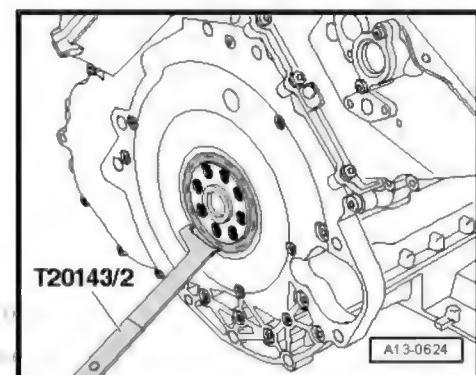


- ◆ Guide piece - T10122/6-
- ◆ Extractor hook - T20143/2-

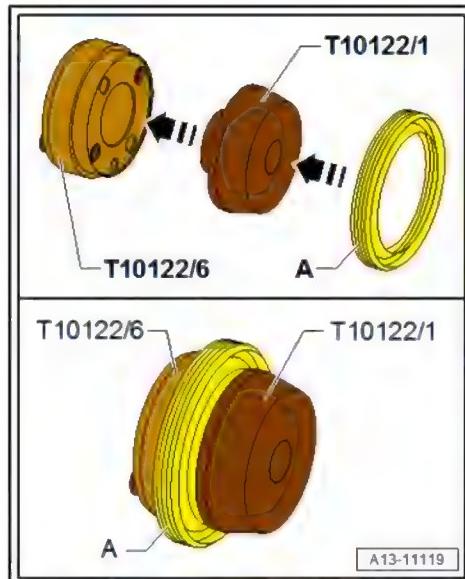


Procedure

- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove drive plate [page 84](#) .
- Pry out oil seal using extractor tool -T20143/2- .
- Clean contact surface and sealing surface.



- Fit assembly aid -T10122/1- onto guide piece - T10122/6- and slide oil seal -A- onto guide piece.
- Detach assembly aid -T10122/1- .



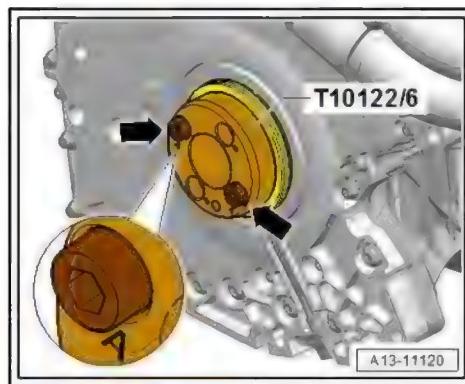
- Fit guide piece - T10122/6- onto crankshaft.
- Bolt guide piece to crankshaft through securing points -A- using bolts -arrows-.



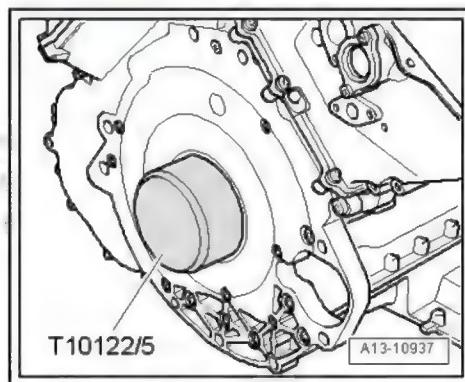
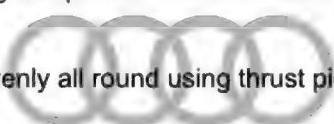
Caution

Risk of leaks if installed incorrectly.

- ◆ Slide oil seal onto crankshaft by hand to prevent sealing lip on oil seal from folding over.



- Slide oil seal over guide piece - T10122/6- onto crankshaft by hand.
- Press in oil seal evenly all round using thrust piece - T10122/5- .
- Remove guide piece - T10122/6- .
- Check that oil seal and its sealing lip are correctly seated. If sealing lip is partially folded over, repeat procedure with a new oil seal.
- Install drive plate [⇒ page 84](#).



2.6 Renewing needle bearing in drive plate

Special tools and workshop equipment required

- ◆ Thrust plate - VW 402-



- ◆ Tube - VW 418 A-



- ◆ Tube - VW 421-



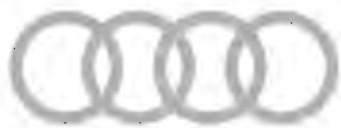
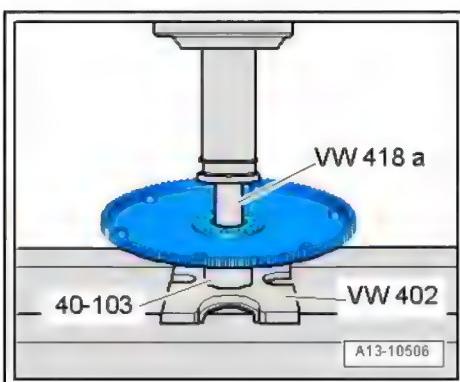
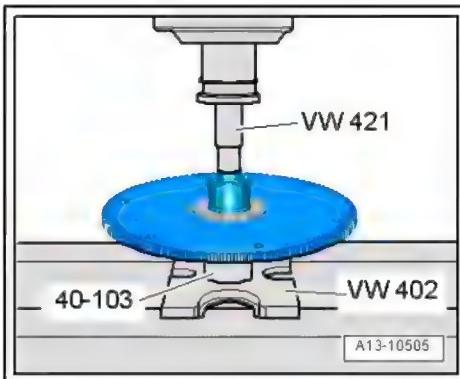
- ◆ Support - 40-103-



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Procedure

- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove drive plate [⇒ page 84](#) .
- Place support - 40-103- under drive plate when pressing out and pressing in needle bearing.
- Use tube - VW 421- and workshop press and press out needle bearing.
- Smaller diameter of tube -VW 421- faces drive plate.
- Carefully press in needle bearing as far as stop, using tube - VW 418 A- and workshop press.
- Installation position: closed side of needle bearing faces engine.
- Install drive plate [⇒ page 84](#) .



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3 Crankshaft

- ⇒ "3.1 Exploded view - crankshaft", page 91
- ⇒ "3.2 Crankshaft dimensions", page 94
- ⇒ "3.3 Measuring axial clearance of crankshaft", page 95
- ⇒ "3.4 Measuring radial clearance of crankshaft", page 95

3.1 Exploded view - crankshaft



Note

When performing assembly work, secure engine to engine and gearbox support - VAS 6095- ⇒ page 47.

1 - Sealing flange (pulley end)

- Renewing ⇒ "1.6 Removing and installing sealing flange (pulley end)", page 80

2 - Bolt

- Tightening torque and sequence ⇒ Fig. "Sealing flange (pulley end) - tightening torque and sequence", page 71

3 - Crankshaft

- Measuring axial clearance ⇒ "3.3 Measuring axial clearance of crankshaft", page 95
- Measuring radial clearance ⇒ "3.4 Measuring radial clearance of crankshaft", page 95
- Crankshaft dimensions ⇒ "3.2 Crankshaft dimensions", page 94

4 - Dowel sleeve

- 4x
- Inserting in retaining frame ⇒ Fig. "Applying sealant to retaining frame, position of dowel sleeves", page 93

5 - Seal

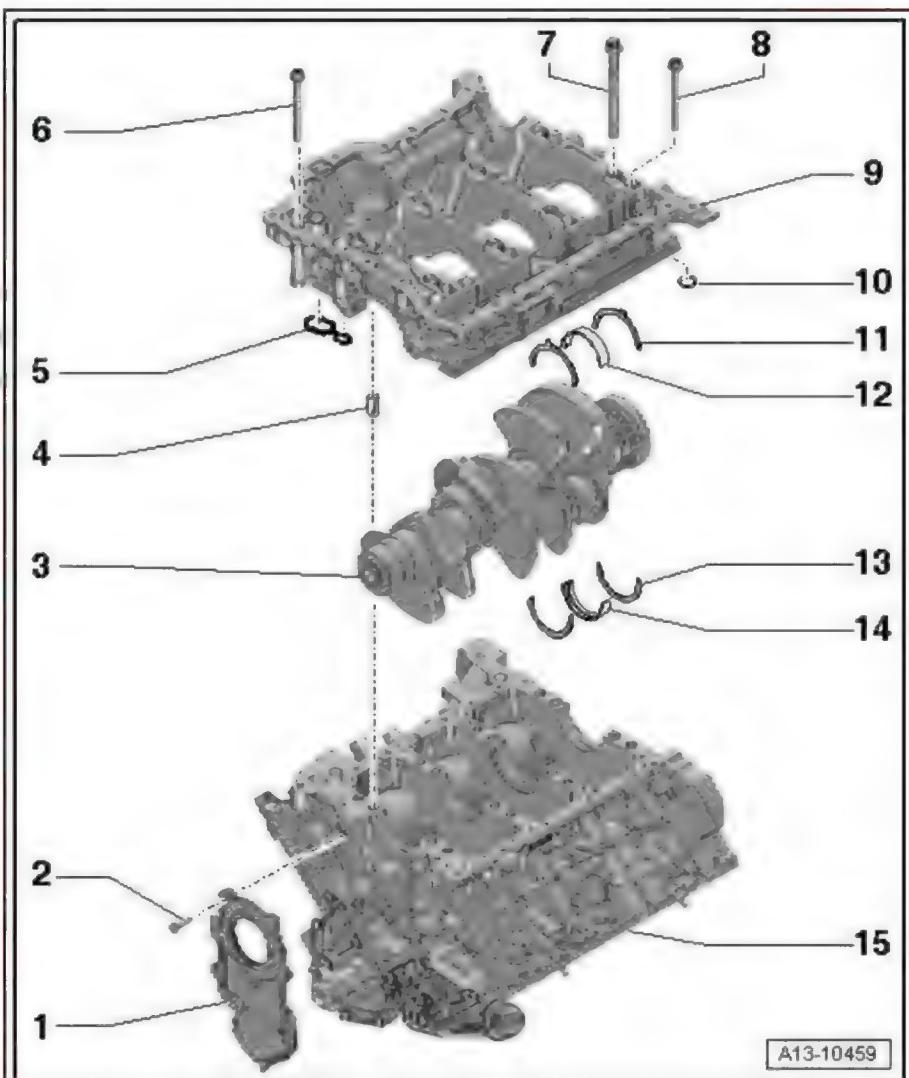
- Renew

6 - Bolt

- For sealing surfaces: retaining frame to cylinder block
- Differing bolt lengths and bolt heads
- Tightening torque and sequence ⇒ Fig. "Installing retaining frame", page 94

7 - Bolt

- Long, large collar



- For retaining frame (inner row)
- Renew
- Use old bolts when measuring radial clearance
- Tightening torque and sequence [⇒ Fig. ““Installing retaining frame””, page 94](#)

8 - Bolt

- Short, small collar
- For retaining frame (outer row)
- Tightening torque and sequence [⇒ Fig. ““Installing retaining frame””, page 94](#)

9 - Retaining frame

- With valve for oil pressure control - N428- [⇒ Fig. ““ Valve for oil pressure control -N428- ””, page 93](#)
- To remove, detach guide rail [⇒ Item 1 \(page 121\)](#) for drive chain for valve gear
- Applying sealant [⇒ Fig. ““Applying sealant to retaining frame, position of dowel sleeves””, page 93](#)
- Removing and installing valve for oil pressure control - N428- [⇒ “4.6 Removing and installing valve for oil pressure control N428 ”, page 198](#)

10 - Seal

- Renew

11 - Thrust washer

- Only fitted on 3rd crankshaft bearing
- Installation position: oil groove faces outwards
- Make sure it engages in retaining frame

12 - Bearing shell

- For retaining frame (without oil groove)
- Renew used bearing shells
- Note installation position
- Install new bearing shells for retaining frame with correct coloured markings [⇒ Fig. ““Matching crankshaft bearing shells to bearings in retaining frame””, page 94](#)

13 - Thrust washer

- Only fitted on 3rd crankshaft bearing
- Installation position: oil groove faces outwards
- Make sure it engages in retaining frame

14 - Bearing shell

- For cylinder block (with oil groove)
- Renew used bearing shells
- Note installation position
- Install new bearing shells for the cylinder block with the correct coloured markings [⇒ Fig. ““Matching crankshaft bearing shells to bearings in cylinder block””, page 94](#)

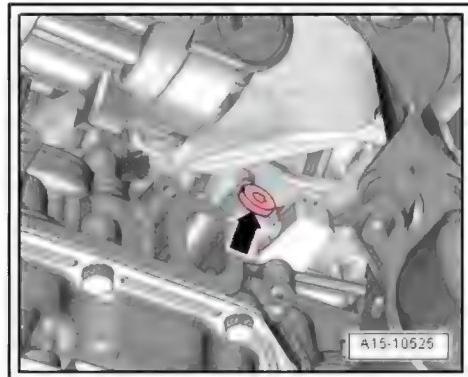
15 - Cylinder block

Plug for "TDC" marking - tightening torque



Fit new O-ring.

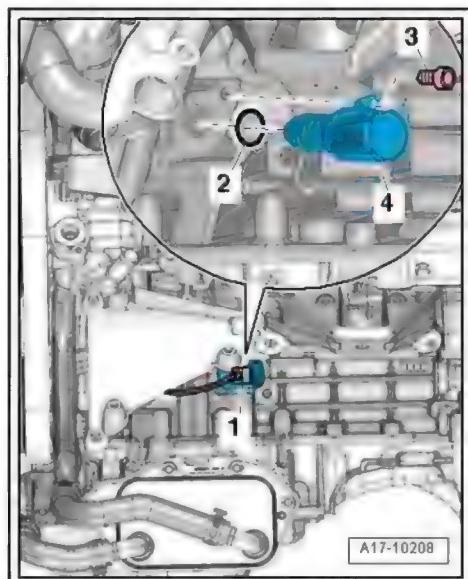
- Tighten plug -arrow- to 14 Nm.



A15-10525

Valve for oil pressure control - N428-

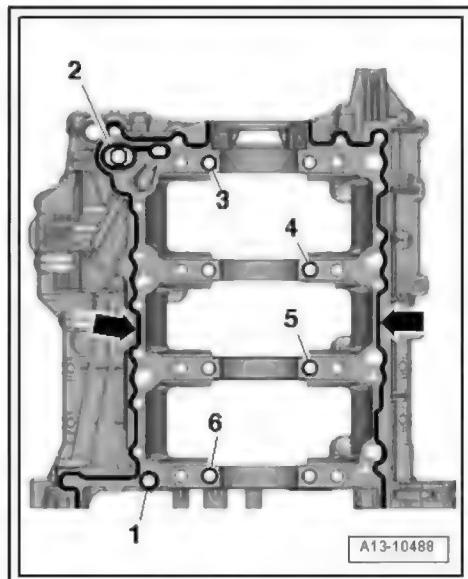
- 1 - Electrical connector
- 2 - O-ring - renew
- 3 - Bolt, 9 Nm
- 4 - Valve for oil pressure control - N428-



A17-10208

Applying sealant to retaining frame, position of dowel sleeves

- Clean surfaces; they must be free of oil and grease.
- Apply sealant beads -arrows- onto clean sealing surfaces of retaining frame as shown in illustration.
- The groove on the sealing surface must be completely filled with sealant.
- The beads of sealant must project 1.5 ... 2.0 mm above the sealing surface.
- Fit seals -1- and -2-.
- Check that dowel sleeves -3 ... 6- are inserted in retaining frame at positions shown in illustration.



A13-10488



Installing retaining frame

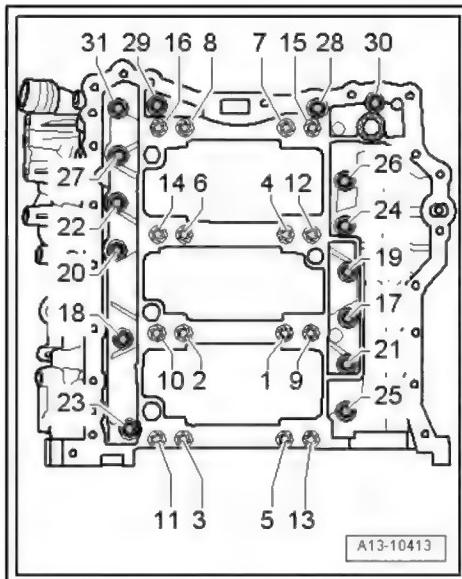


Note

Renew the bolts tightened with specified tightening angle.

- Install long bolts in inner row on retaining frame.
- Tighten bolts in 4 stages in the sequence shown:

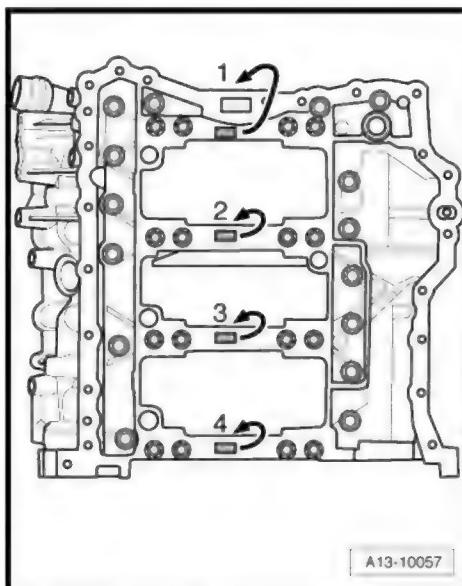
Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 16-	50 Nm
2.	-1 ... 16-	Turn 90° further
3.	-17 ... 31-	20 Nm
4.	-17 ... 31-	Turn 90° further



Matching crankshaft bearing shells to bearings in cylinder block

- ◆ Bearing shells of the correct thickness are matched to the bearings in the cylinder block at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- ◆ The allocation of the bearing shells to the bearing positions in the cylinder block is indicated by a code letter at the relevant bearing on the retaining frame.

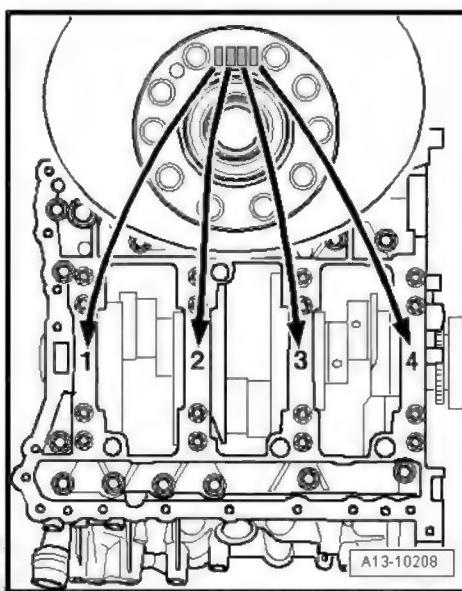
Code letter on retaining frame	Colour coding of bearing
R =	Red
G =	Yellow
B =	Blue
S =	Black



Matching crankshaft bearing shells to bearings in retaining frame

- ◆ Bearing shells of the correct thickness are matched to the bearings in the retaining frame at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- ◆ The allocation of the bearing shells to the bearing positions in the retaining frame is indicated by a sequence of letters on the flywheel flange on the crankshaft. The first letter in the sequence stands for bearing "1", the second letter for bearing "2", etc.

Letter on crankshaft	Colour coding of bearing
R =	Red
G =	Yellow
B =	Blue
S =	Black



3.2 Crankshaft dimensions

Honing dimension	Main bearing journal Ø mm	Conrod journal Ø mm
Basic dimension	65.000 – 0.022 – 0.042	56.000 – 0.022 – 0.042

3.3 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-



W00-11125

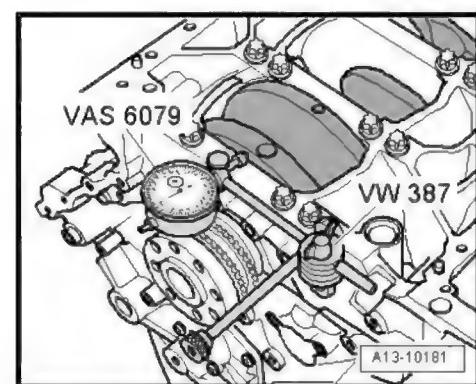
- ◆ Dial gauge - VAS 6079-



W00-11309

Procedure

- Secure dial gauge - VAS 6079- with universal dial gauge bracket - VW 387- to cylinder block as shown in illustration.
- Apply dial gauge to crank web.
- Press crankshaft against dial gauge by hand and set gauge to "0".
- Push crankshaft away from dial gauge and read off value.
- Axial clearance: 0.15 ... 0.25 mm



3.4 Measuring radial clearance of crankshaft

Special tools and workshop equipment required

- ◆ Plastigauge

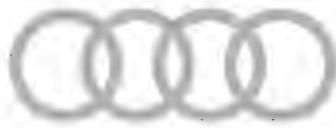
Procedure

- Remove retaining frame and clean bearing journals.
- Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or in the bearing shell.

- The Plastigauge must be positioned in the centre of the bearing shell.
- Fit retaining frame, secure with old bolts and tighten to final torque [⇒ Item 7 \(page 91\)](#) without rotating crankshaft.
- Remove retaining frame again.
- Compare width of Plastigauge with measurement scale.

Radial clearance:

- New: 0.015 ... 0.055 mm.
- Wear limit: 0.080 mm.
- Renew bolts for retaining frame which are tightened by turning through specified angle.



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4 Balance shaft

⇒ "4.1 Exploded view - balance shaft", page 97

⇒ "4.2 Removing and installing balance shaft", page 97

4.1 Exploded view - balance shaft

1 - Balance shaft

- Removing and installing
⇒ "4.2 Removing and installing balance shaft", page 97

2 - Bolt

- Use locating pin - T40116- as counterhold when loosening and tightening
- 60 Nm

3 - Balance weight (gearbox end)

- Can only be fitted on balance shaft in one position.

4 - Bearing plate

5 - Bolt

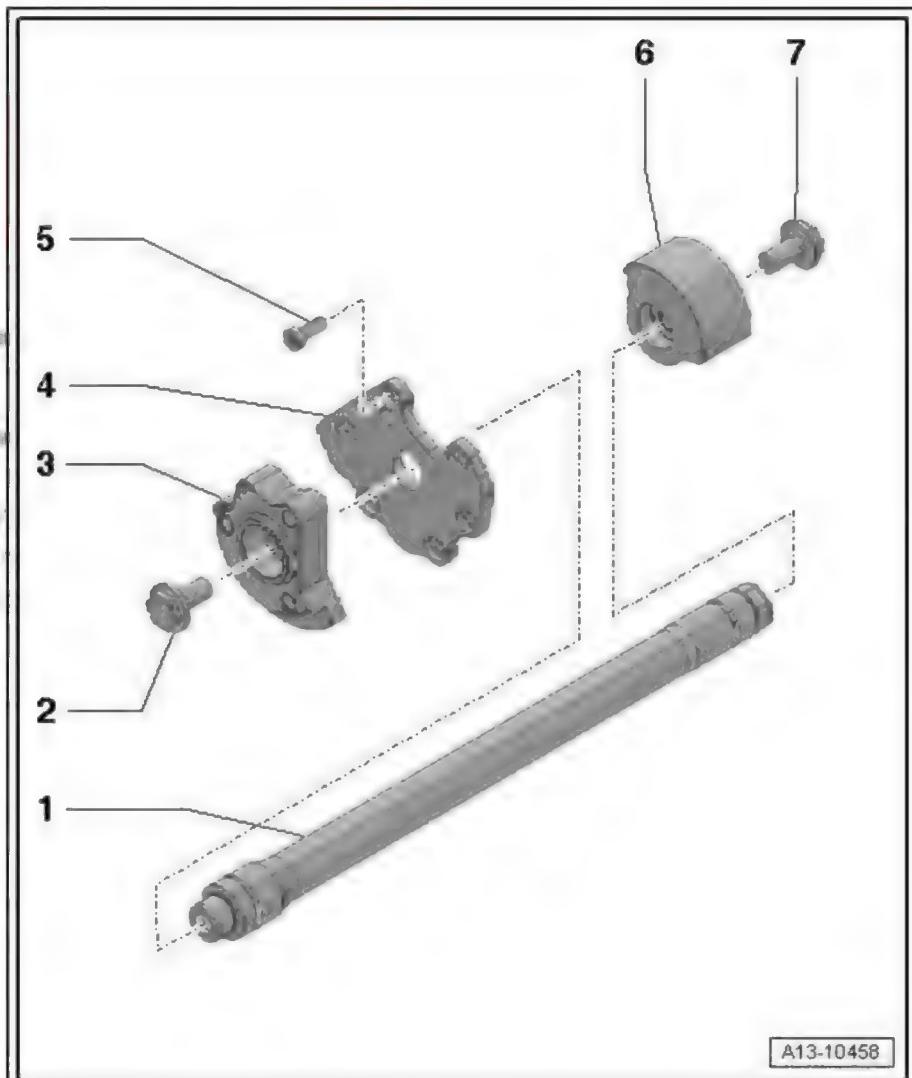
- 13 Nm

6 - Balance weight (pulley end)

- Can only be fitted on balance shaft in one position.

7 - Bolt

- Use locating pin - T40116- as counterhold when loosening and tightening
- 60 Nm

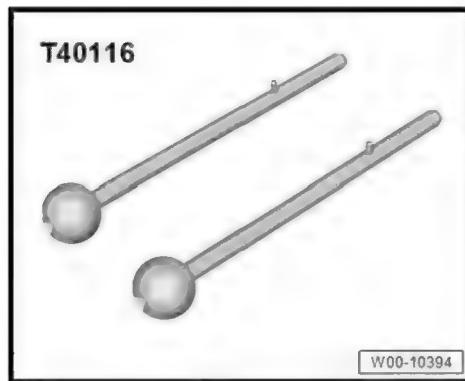


A13-10458

4.2 Removing and installing balance shaft

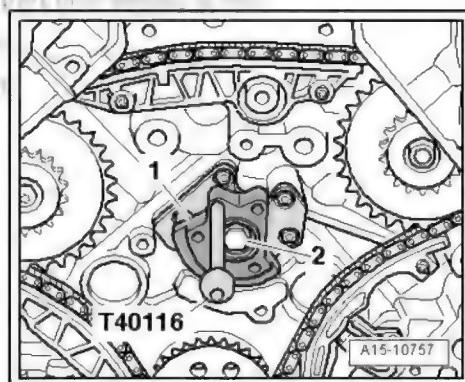
Special tools and workshop equipment required

◆ Locating pins - T40116-

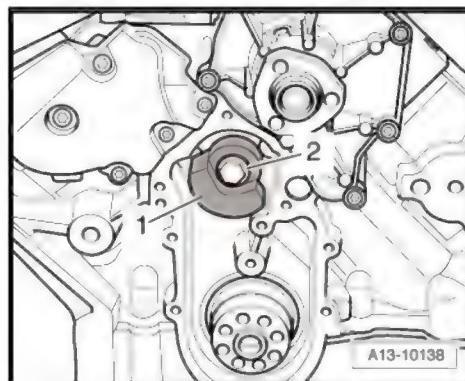


Removing

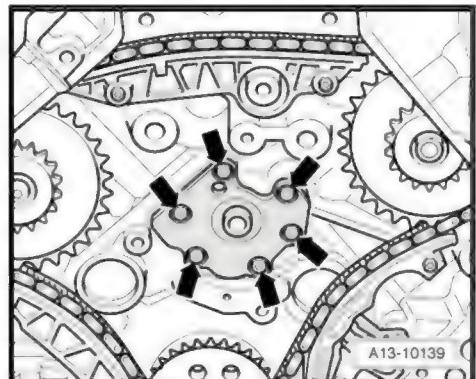
- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove sealing flange (pulley end) [⇒ page 80](#) .
- Remove timing chain cover (bottom) [⇒ page 112](#) .
- Remove drive chain for auxiliary drives [⇒ page 138](#) .
- Use locating pin -T40116- to lock balance weight -1- in position at rear of engine.
- Unscrew bolt -2- and detach balance weight from balance shaft.



- Unscrew bolt -2- (counterhold balance weight -1- with a suitable pin) and detach balance weight at front of engine from balance shaft.



- Unscrew bolts -arrows- and detach bearing plate for balance shaft at rear of engine.
- Pull balance shaft to rear out of cylinder block.



A13-10139

Installing

Installation is carried out in reverse order; note the following:

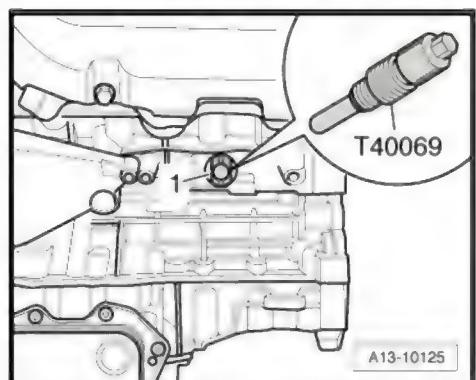
- Crankshaft -1- locked in "TDC" position with locking pin - T40069- .



Note

Balance weights can only be fitted on balance shaft in one position.

- Install drive chain for auxiliary drives [⇒ page 138](#) .
- Install timing chain cover (bottom) [⇒ page 112](#) .
- Install sealing flange (pulley end) [⇒ page 80](#) .



A13-10125

Tightening torques

◆ [⇒ 4.1 Exploded view "balance shaft", page 97](#)

5 Pistons and conrods

- ⇒ “5.1 Exploded view - pistons and conrods”, page 100
- ⇒ “5.2 Removing and installing pistons”, page 102
- ⇒ “5.3 Checking pistons and cylinder bores”, page 103
- ⇒ “5.4 Checking radial clearance of conrod bearings”, page 104

5.1 Exploded view - pistons and conrods



Note

- ◆ All bearing and running surfaces must be oiled before assembling.
- ◆ Oil spray jet for piston cooling ⇒ Fig. “Oil spray jet for piston cooling”, page 102.

1 - Bolts

- Renew
- Use old bolts when measuring radial clearance
- Lubricate threads and contact surface
- 50 Nm +90°

2 - Conrod bearing cap

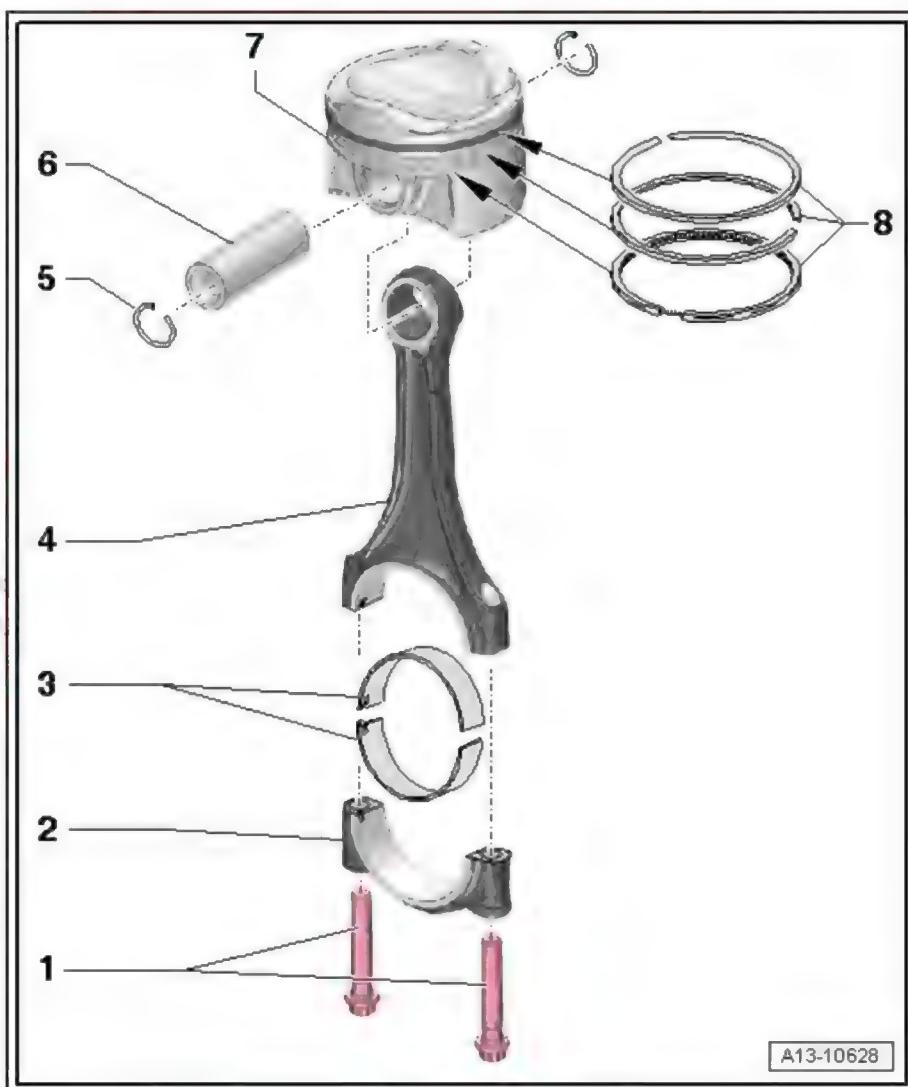
- Mark installation position for re-installation
- Mark cylinder allocation in colour ⇒ Fig. “Marking conrods”, page 101
- Installation position of conrod pairs ⇒ Fig. “Conrod installation position”, page 102

3 - Bearing shells

- Ensure that retaining lugs are securely seated.
- Renew used bearing shells
- There are oversized bearings available for machined crankshaft conrod journals ⇒ Electronic parts catalogue
- Lugs on conrod bearings must be on the same side

4 - Conrod

- Only renew as a complete set
- Mark cylinder allocation in colour ⇒ Fig. “Marking conrods”, page 101
- Installation position of conrod pairs ⇒ Fig. “Conrod installation position”, page 102
- Axial clearance for each conrod pair (when new): 0.20 ... 0.45 mm



A13-10628

- Measuring radial clearance ⇒ "5.4 Checking radial clearance of conrod bearings", page 104

5 - Circlip

- Renew

6 - Piston pin

- Removing and installing ⇒ "5.2 Removing and installing pistons", page 102

7 - Piston

- Mark installation position and cylinder number ⇒ Fig. "Installation position of pistons", page 101
- Renew piston if cracking is visible on piston crown or piston skirt
- Removing and installing ⇒ "5.2 Removing and installing pistons", page 102
- Checking ⇒ Fig. "Checking piston", page 103
- Install using piston ring clamp
- Piston and cylinder dimensions ⇒ "5.3 Checking pistons and cylinder bores", page 103
- Measuring cylinder bore ⇒ Fig. "Measuring cylinder bore", page 104

8 - Piston rings

- Measuring ring gap ⇒ Fig. "Measuring piston ring gap", page 104
- Measuring ring-to-groove clearance ⇒ Fig. "Measuring ring-to-groove clearance", page 104
- Use piston ring pliers to remove and install
- Installation position: marking "TOP" or side with lettering faces towards piston crown
- Offset gaps by 120°

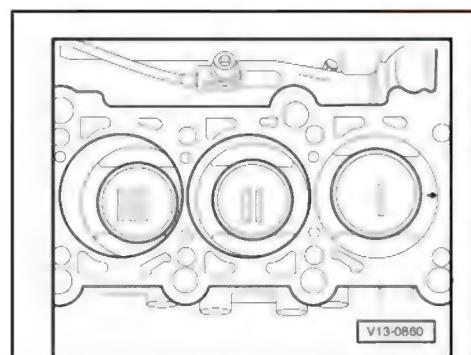
Installation position of pistons



Caution

Do not damage the coating of the piston crown.

- ◆ If you intend to re-install used pistons, mark the cylinder number on the piston crown using paint. Do not attempt to mark the piston crown with a centre punch or by making a notch or similar.



Installation position:

- Arrows on piston crowns point to pulley end.

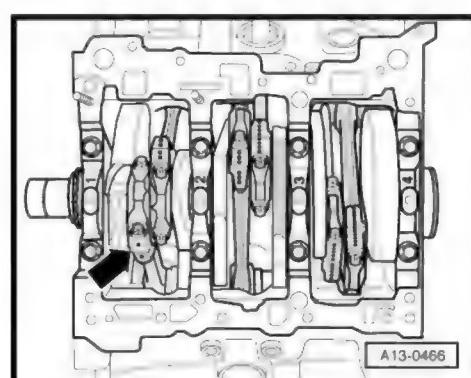
Marking conrods



Note

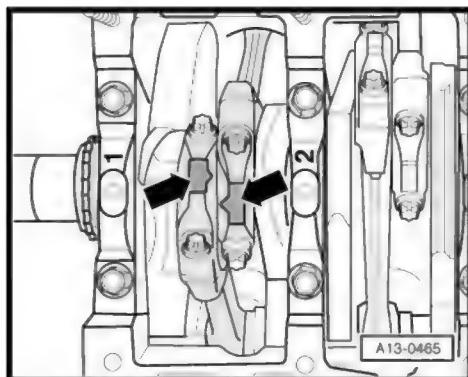
Only renew conrods as a complete set.

- Use a coloured pen to mark matching conrods and conrod bearing caps with cylinder numbers -arrow- for re-installation.



Conrod installation position

- The cast lugs -arrows- on the ground surfaces of the conrod pairs "1 and 2", "3 and 4", and "5 and 6" must face each other.



Oil spray jet for piston cooling

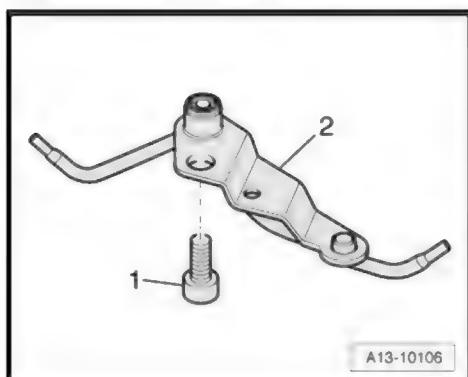
- Apply locking fluid to bolt and tighten to 9 Nm; for locking fluid refer to ⇒ Electronic parts catalogue .
- Oil spray jet with spray nozzle valve (opening pressure: 2 ... 2.4 bar)



Caution

Risk of damage to oil spray jets due to deformation.

- Never bend oil spray jets.



5.2 Removing and installing pistons

Special tools and workshop equipment required

- ♦ Pin - VW 222 A-



- ♦ Piston ring clamp, commercially available

Removing

- Engine secured to engine and gearbox support - VAS 6095-
[page 47](#)
- Remove cylinder head [page 145](#) .
- Remove sump (top section) [page 183](#) .
- Mark installation position and matching of conrod bearing caps to cylinder and to conrods for re-installation [page 101](#) .
- Unbolt conrod bearing caps.
- Pull out pistons upwards with conrods.



Note

If piston pin is difficult to remove, heat piston to approx. 60 °C.

- Take circlip out of piston pin boss.
- Use drift - VW 222 A- to drive out piston pin.

Installing

Installation is carried out in reverse order; note the following:



Note

Renew the bolts tightened with specified tightening angle.

- Oil running surfaces of bearing shells.
- Install pistons using piston ring clamp.

Installation position:

- Pistons ⇒ Fig. “[Installation position of pistons](#)” , page 101
- Conrods ⇒ Fig. “[Conrod installation position](#)” , page 102
- Install conrod bearing caps according to markings.
- Install sump (upper section) ⇒ [page 183](#) .
- Install cylinder head ⇒ [page 145](#) .

Tightening torques

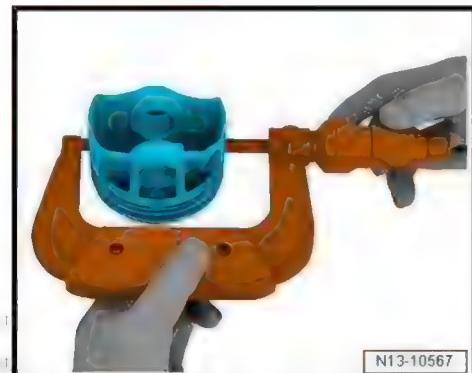
- ◆ ⇒ “[5.1 Exploded view - pistons and conrods](#)”, page 100

5.3 Checking pistons and cylinder bores

Checking piston

- Using a micrometer (75 ... 100 mm), measure approx. 15 mm from the lower edge, perpendicular to the piston pin axis.
- Maximum deviation from nominal dimension: 0.03 mm.

Piston Ø mm	
Nominal dimension	84.49 ¹⁾
• ¹⁾ Dimensions including coating (thickness approx. 0.02 mm). The coating will wear down in service.	

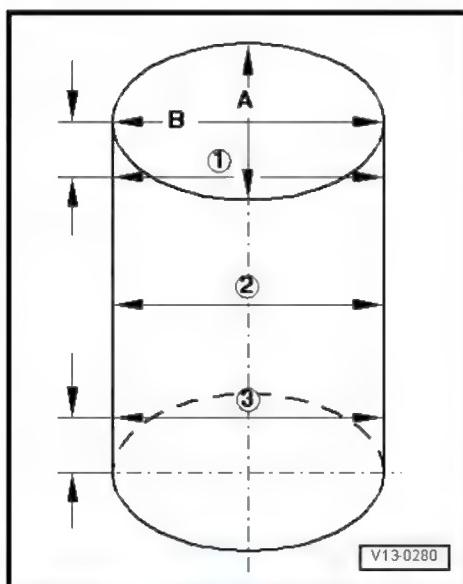


N13-10567

Measuring cylinder bore

- Use a cylinder gauge - VAS 6078- to take measurements at 3 points in transverse direction -A- and in longitudinal direction -B-.
- Maximum deviation from nominal dimension: 0.08 mm.

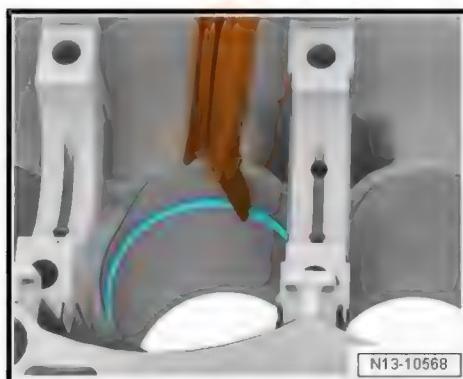
Cylinder bore Ø mm	
Nominal dimension	84.51 ¹⁾
• 1) Measure at 50 mm into cylinder bore.	



Measuring piston ring gap

- Insert ring at right angle to cylinder wall from above and push down into lower cylinder opening approx. 15 mm from bottom of cylinder.
- To do so, use a piston without rings.

Piston ring	new mm	Wear limit mm
1. Compression ring	0.20 ... 0.30	0.80
2. Compression ring	0.50 ... 0.70	0.80
Oil scraper ring	0.25 ... 0.50	— 1)
• 1) Specification not yet available.		



Measuring ring-to-groove clearance

- Clean groove in piston before checking clearance.

Piston ring	new mm	Wear limit mm
1. Compression ring	0.04 ... 0.08	0.20
2. Compression ring	0.03 ... 0.07	0.20
Oil scraper ring	0.02 ... 0.06	0.15



5.4 Checking radial clearance of conrod bearings

Special tools and workshop equipment required

- ◆ Plastigauge

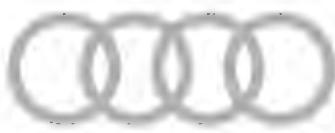
Procedure

- Remove conrod bearing cap.
- Clean bearing cap and bearing journal.
- Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or in the bearing shell.

- Fit conrod bearing cap and tighten to final torque with old bolts
⇒ [Item 1 \(page 100\)](#). Do not rotate crankshaft when doing so.
- Remove conrod bearing cap again.
- Compare width of Plastigauge with measurement scale.

Radial clearance:

- New: 0.010 ... 0.052 mm.
- Wear limit: 0.120 mm.
- Renew conrod bolts.



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15 – Cylinder head, valve gear

1 Timing chain cover

⇒ “1.1 Exploded view - timing chain cover”, page 106

⇒ “1.2 Removing and installing timing chain cover”, page 109

1.1 Exploded view - timing chain cover

1 - Bolt

- Renew
- Tightening torque and sequence ⇒ Fig. “Timing chain cover (bottom) - tightening torque and sequence”, page 108

2 - Oil seal

- For crankshaft (gearbox end)
- Renewing ⇒ “2.5 Renewing crankshaft oil seal (gearbox end)”, page 87

3 - Bolt

- Renew
- Tightening torque and sequence ⇒ Fig. “Timing chain cover (bottom) - tightening torque and sequence”, page 108

4 - Dowel sleeve

- 2x

5 - Threaded pin

- Tightening torque ⇒ Fig. “Timing chain cover (bottom) - tightening torque and sequence”, page 108

6 - Cylinder head gasket (left-side)

7 - Bolt

- Renew
- Tightening torque and sequence ⇒ Fig. “Timing chain cover (left-side) - tightening torque and sequence”, page 108

8 - Bracket

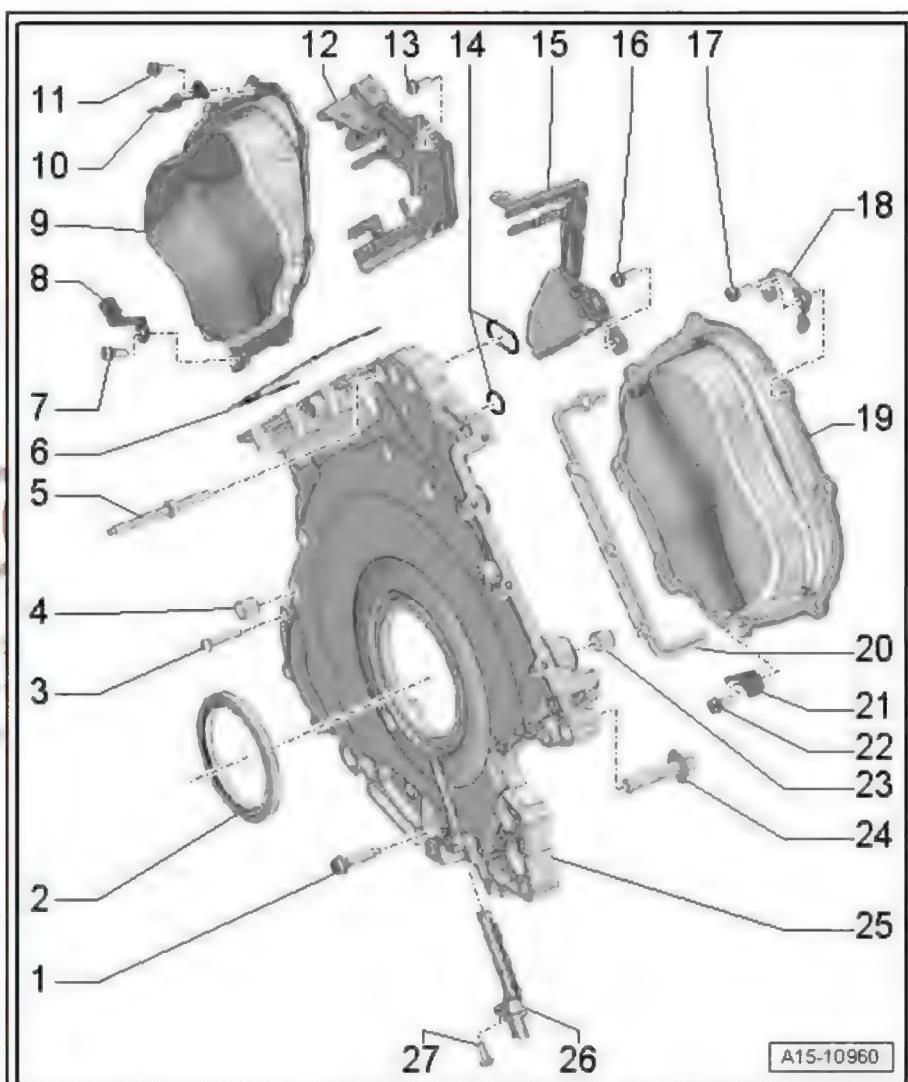
- For heat shield

9 - Timing chain cover (left-side)

- Removing and installing ⇒ “1.2.1 Removing and installing timing chain covers (left and right)”, page 109

10 - Retainer

- For wiring harness



11 - Bolt

- Renew
- Tightening torque and sequence ⇒ Fig. “Timing chain cover (left-side) - tightening torque and sequence”, page 108

12 - Bracket

- For electrical connectors for Lambda probes (left-side)

13 - Bolt

- Tightening torque and sequence ⇒ Fig. “Timing chain cover (left-side) - tightening torque and sequence”, page 108

14 - Seals

- Renew

15 - Bracket

- For electrical connectors for Lambda probes (right-side)

16 - Bolt

- Tightening torque and sequence ⇒ Fig. “Timing chain cover (left-side) - tightening torque and sequence”, page 108

17 - Bolt

- Tightening torque and sequence ⇒ Fig. “Timing chain cover (right-side) - tightening torque and sequence”, page 108

18 - Bracket

- For electrical connectors

19 - Timing chain cover (right-side)

- Removing and installing ⇒ “1.2.1 Removing and installing timing chain covers (left and right)”, page 109

20 - Cylinder head gasket (right-side)

21 - Bracket

- For heat shield

22 - Bolt

- Renew
- Tightening torque and sequence ⇒ Fig. “Timing chain cover (right-side) - tightening torque and sequence”, page 108

23 - Dowel sleeve

- 2x

24 - Bolt

- Tightening torque and sequence ⇒ Fig. “Timing chain cover (bottom) - tightening torque and sequence”, page 108

25 - Timing chain cover (bottom)

- Removing and installing ⇒ “1.2.2 Removing and installing timing chain cover (bottom)”, page 112

26 - Engine speed sender - G28-

- Removing and installing ⇒ “1.6 Removing and installing engine speed sender G28”, page 367

27 - Bolt

- Tightening torque ⇒ Item 11 (page 363)

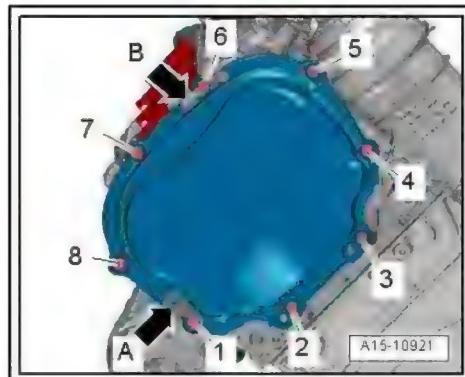
Timing chain cover (left-side) - tightening torque and sequence



Note

- ◆ Renew the bolts tightened with specified tightening angle.
- ◆ The brackets -arrows A and B- are secured together with the timing chain cover (left-side).
- Tighten bolts in 2 stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 8-	5 Nm
2.	-1 ... 8-	Turn 90° further



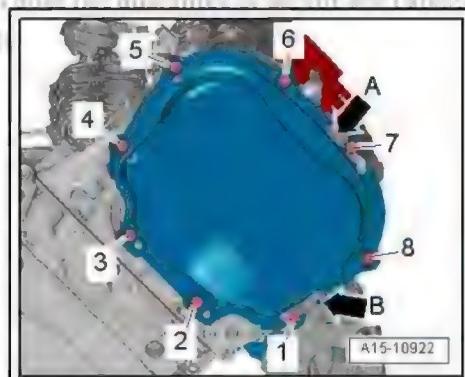
Timing chain cover (right-side) - tightening torque and sequence



Note

- ◆ Renew the bolts tightened with specified tightening angle.
- ◆ The brackets -arrows A and B- are secured together with the timing chain cover (right-side).
- Tighten bolts in 2 stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 8-	5 Nm
2.	-1 ... 8-	Turn 90° further



Timing chain cover (bottom) - tightening torque and sequence



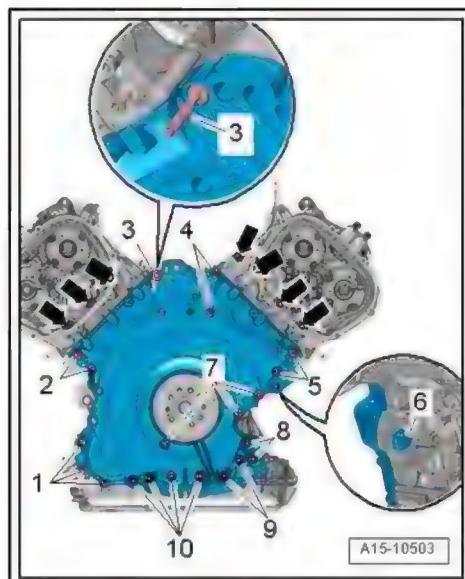
Note

Renew the bolts tightened with specified tightening angle.

Securing with aluminium bolts:

- Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-arrows-	3 Nm
2.	-1 ... 10-	3 Nm in diagonal sequence
3.	-1, 2, 4, 5, 7-	Turn 90° further
4.	-arrows-	9 Nm
5.	-8, 9, 10-	8 Nm
6.	-8, 9, 10-	Turn 90° further
7.	-3-	16 Nm
8.	-6-	20 Nm
9.	-6-	Turn 180° further



Securing with steel bolts:

- Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-arrows-	3 Nm
2.	-1 ... 10-	3 Nm in diagonal sequence
3.	-1, 2, 4, 5, 7- and -arrows-	9 Nm
4.	-8, 9, 10-	20 Nm
5.	-3-	16 Nm
6.	-6-	70 Nm

1.2 Removing and installing timing chain cover

⇒ “1.2.1 Removing and installing timing chain covers (left and right)”, page 109

⇒ “1.2.2 Removing and installing timing chain cover (bottom)”, page 112

1.2.1 Removing and installing timing chain covers (left and right)

Special tools and workshop equipment required

- ◆ Electric drill with plastic brush
- ◆ Safety goggles
- ◆ Sealant ⇒ Electronic parts catalogue

Removing

 Note

Fit all cable ties in the original positions when installing.

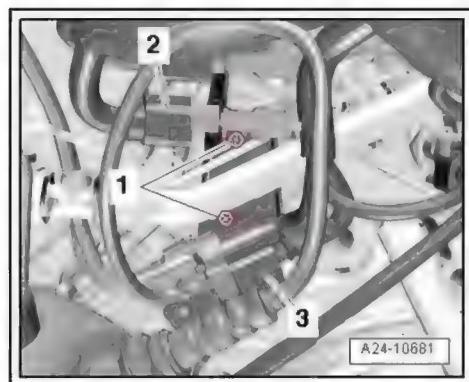
- Remove engine cover panel (rear) ⇒ page 67 .
- Remove corresponding combination valve for secondary air system: left-side ⇒ page 348 , right-side ⇒ page 351 .

Timing chain cover (left-side):

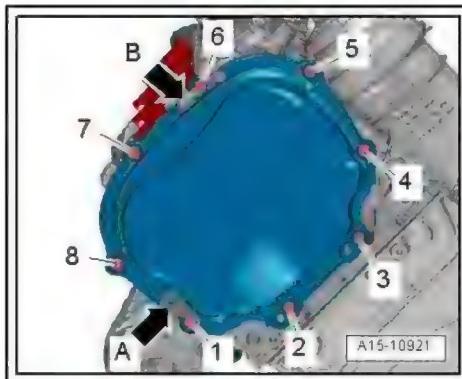
- Remove bolts -1- and move bracket with electrical connectors to one side.

 Note

Disregard items -2 and 3-.



- Unscrew bolts -1 ... 8- and detach brackets -arrows A, B-.
- Carefully release timing chain cover (left-side) from bonded joint and detach.

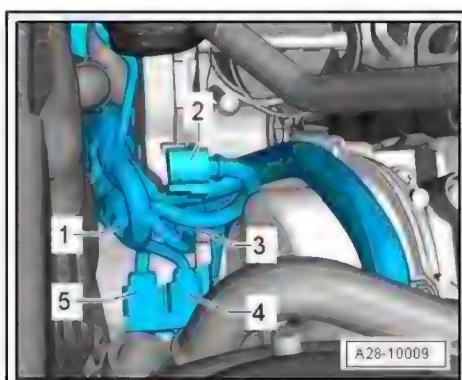


Timing chain cover (right-side):

- Unplug electrical connectors and move wiring clear:
- 4 - For Lambda probe - G39-
- 5 - For Lambda probe after catalytic converter - G130-



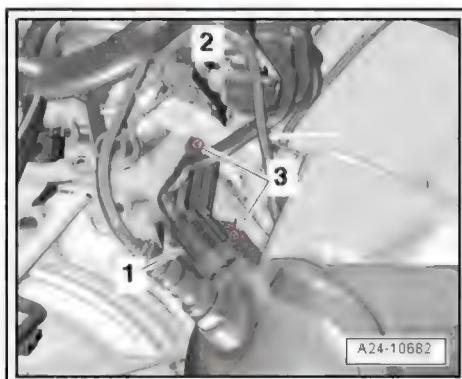
Disregard -items 1, 2 and 3-.



- Remove bolts -3- and move bracket with electrical connectors to one side.



Disregard items -1 and 2-.

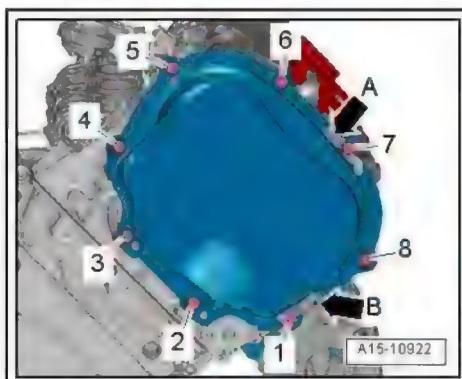


- Move wiring harness clear at timing chain cover (right-side).
- Unscrew bolts -1 ... 8- and detach brackets -arrows A, B-.
- Carefully release timing chain cover (right-side) from bonded joint and detach.

Installing



- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Fit new O-rings.*



Caution

Protect lubrication system against contamination.

- ◆ *Cover exposed parts of the engine.*

- Remove old sealant from sealing surfaces.

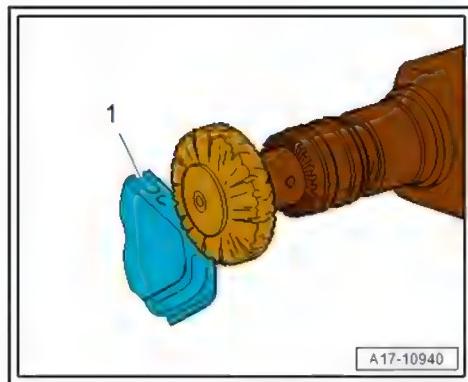


WARNING

Risk of eye injury due to sealant residue.

- Put on safety goggles.

- Remove remaining sealant on timing chain covers -1-, cylinder block and cylinder head using rotating plastic brush or similar.
- Clean surfaces; they must be free of oil and grease.



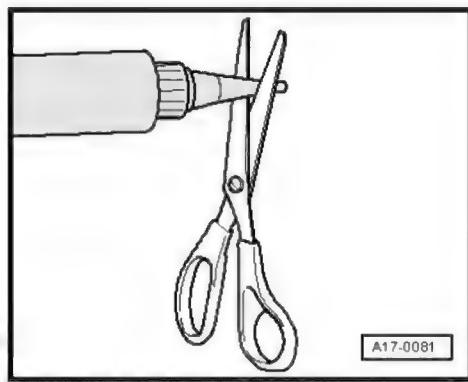
A17-10940



Note

Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle Ø approx. 2 mm).



A17-0081

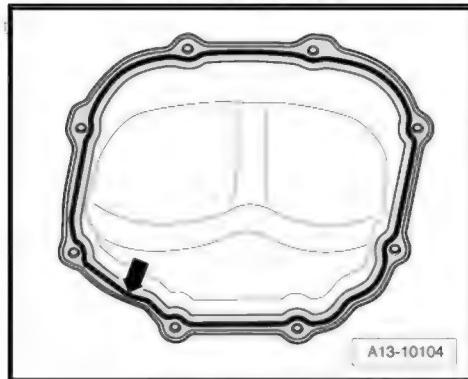


Caution

Make sure lubrication system is not clogged by excess sealant.

- ◆ The sealant bead must not be thicker than specified.

- Apply sealant bead -arrow- onto the clean sealing surface of the timing chain cover (left-side) as illustrated.
- Width of sealant bead: 2.5 mm.



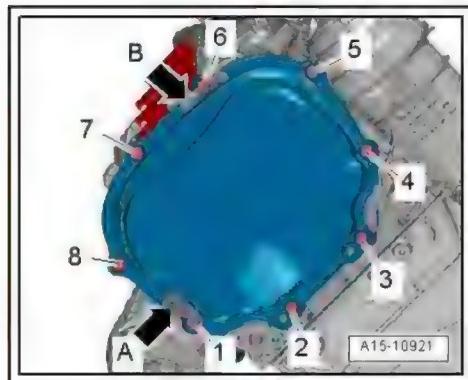
A13-10104



Note

The timing chain covers must be installed within 5 minutes after applying sealant.

- Install timing chain cover (left-side) and tighten bolts ⇒ Fig. “Timing chain cover (left-side) - tightening torque and sequence”, page 108 .



A15-10921

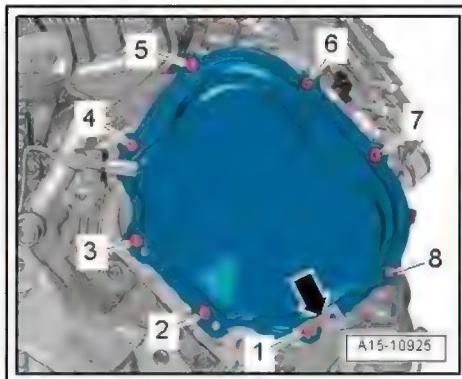
- Install timing chain cover (right-side) and tighten bolts ⇒ Fig. ““Timing chain cover (right-side) - tightening torque and sequence””, page 108 .

Remaining installation steps are carried out in reverse sequence; note the following:

- Install combination valve for secondary air system: left-side ⇒ page 348 , right-side ⇒ page 351 .

Tightening torques

- ◆ ⇒ Fig. ““Timing chain cover (left-side) - tightening torque and sequence””, page 108
- ◆ ⇒ Fig. ““Timing chain cover (right-side) - tightening torque and sequence””, page 108



1.2.2 Removing and installing timing chain cover (bottom)

Special tools and workshop equipment required

- ◆ Electric drill with plastic brush
- ◆ Safety goggles
- ◆ Sealant ⇒ Electronic parts catalogue

Removing

- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Engine oil drained ⇒ Maintenance ; Booklet 411



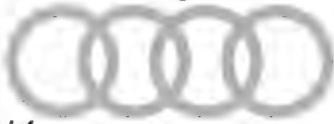
Note

Fit all cable ties in the original positions when installing.

- Remove coolant pipe (top) ⇒ page 232 .
- Remove drive plate ⇒ page 84 .
- Remove timing chain covers (left and right) ⇒ page 109 .
- Remove oil filter housing ⇒ page 196 .
- Unplug electrical connector -3- at starter (push retainer to the rear and press down release catch).
- Remove nut -2- for electrical wiring and detach starter.

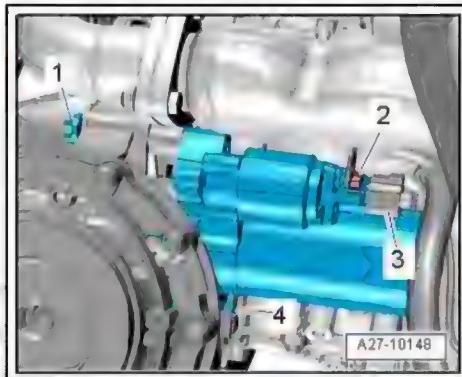


Note

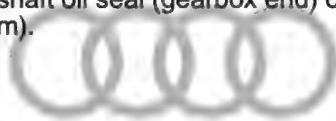


Disregard items -1 and 4-.

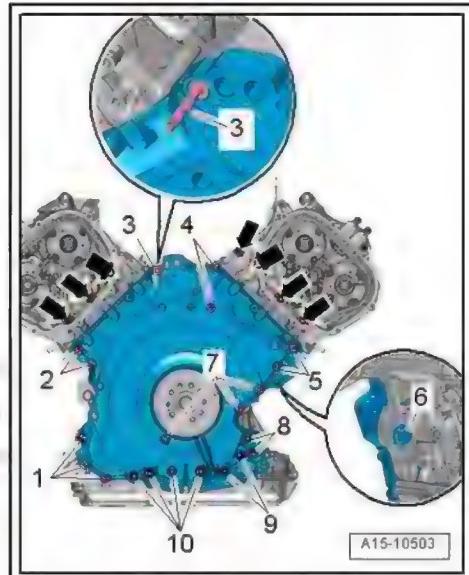
Illustrated by assembly fit. Assembly fit means that the assembly must be assembled in accordance with the assembly drawings. AUDI AG reserves the right to change the contents of the information in the assembly drawings at any time.



- Remove bolts -arrows-.
- Slacken bolts -1 ... 10- in diagonal sequence and remove.
- Carefully release timing chain cover (bottom) from bonded joint and remove cover.
- Press crankshaft oil seal (gearbox end) out of timing chain cover (bottom).



Protect the cylinder block and cylinder head against damage by oil or coolant. Do not use tools to remove the timing chain cover (bottom). If the timing chain cover (bottom) is damaged, it must be replaced.



Installing

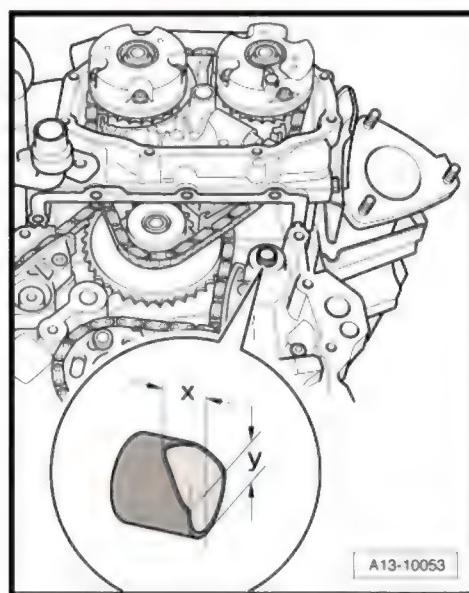


Renew the bolts tightened with specified tightening angle.

- Pull dowel sleeve at top right out of cylinder block.
- Bevel the dowel sleeve with a file, as illustrated.
- Dimension -x- = 6.5 mm
- Dimension -y- = 8 mm
- Fit dowel sleeve on cylinder block in such a way that the bevelled side points upwards.



Bevelling the dowel sleeve makes it easier to fit the timing chain cover (bottom) with the cylinder head installed.



Caution

Protect lubrication system against contamination.

- ◆ Cover exposed parts of the engine.



WARNING

Risk of eye injury due to sealant residue.

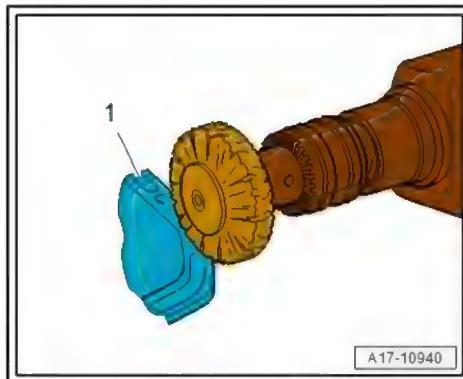
- Put on safety goggles.

- Remove remaining sealant on timing chain cover -1-, cylinder block and cylinder head using rotating plastic brush or similar.
- Clean surfaces; they must be free of oil and grease.
- Before installing gearbox, remove residue from threaded holes for engine/gearbox bolts in cylinder block using a thread tap.
- Clean old sealant from holes -arrow- in cylinder head gaskets.

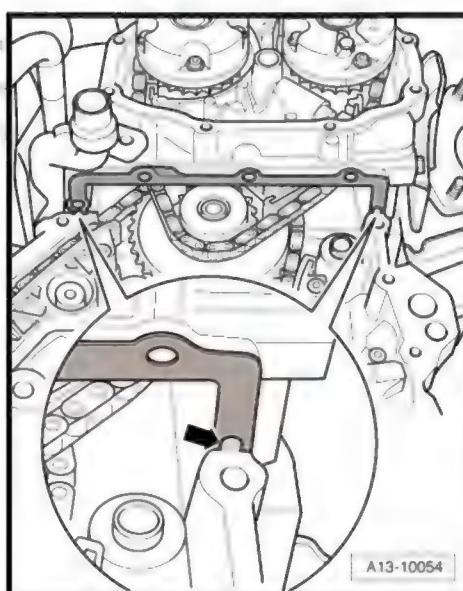


Note

With the cylinder head installed the holes in the cylinder head gasket are only half visible.



A17-10940



A13-10054



Caution

Avoid damage to cylinder head gasket.

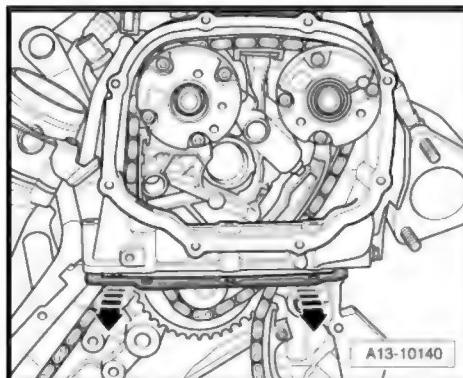
- ◆ Only bend the ends of the cylinder head gaskets slightly and do not kink.



Note

If the cylinder head gasket has been bent and kinked it must be renewed.

- Carefully bend the ends of the cylinder head gaskets down very slightly -arrows-, just far enough to be able to clean the upper sealing surface on the cylinder head gasket and cylinder head.
- Clean cylinder head gaskets (top and bottom); they must be free of oil and grease.



A13-10140



Note

Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle Ø approx. 2 mm).

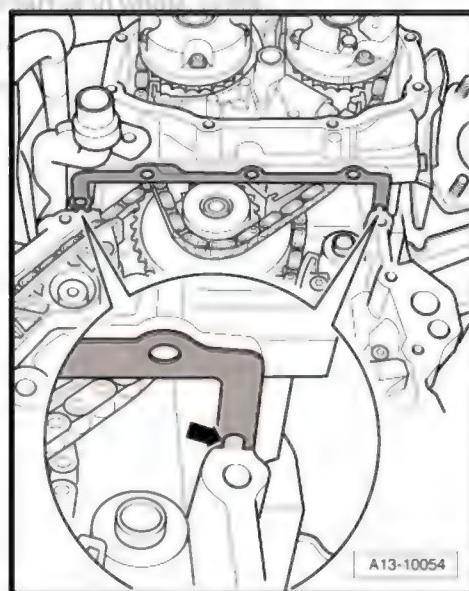
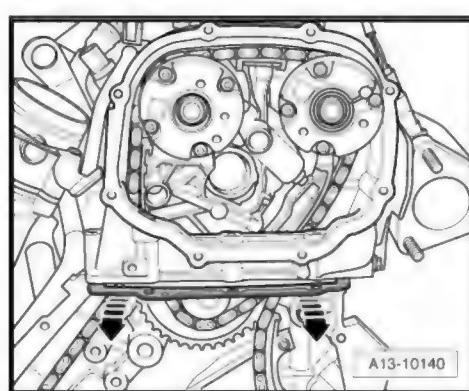
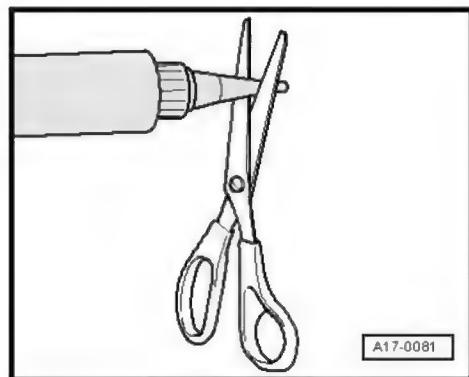


Note

The sealant must be applied at several points on the engine as described below.



- Clean holes -arrow- in cylinder head gaskets and fill them with sealant.





Note

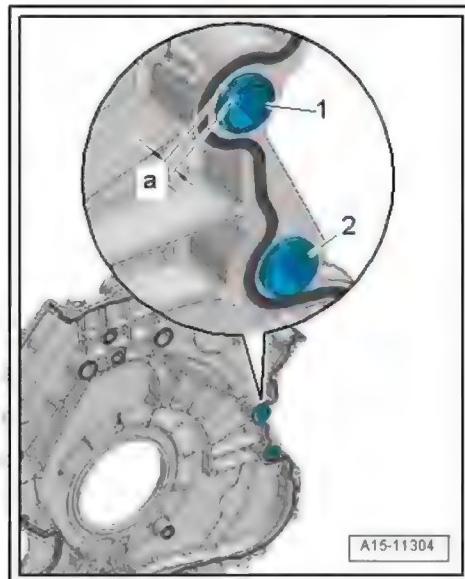
Depending on version, a second sleeve -2- may be fitted between sealing flange and cylinder block on left side of engine.



Caution

Risk of sealant entering hole for gearbox bolt.

- ◆ Appropriate sleeve -1- ⇒ Electronic parts catalogue must be fitted before installing timing chain cover (bottom).
- ◆ Projection of sleeve -a- = 3 mm above the sealing surface.



Note

Sleeves -1- and -2- have different diameters and are not interchangeable.

Timing chain cover (bottom), version 1

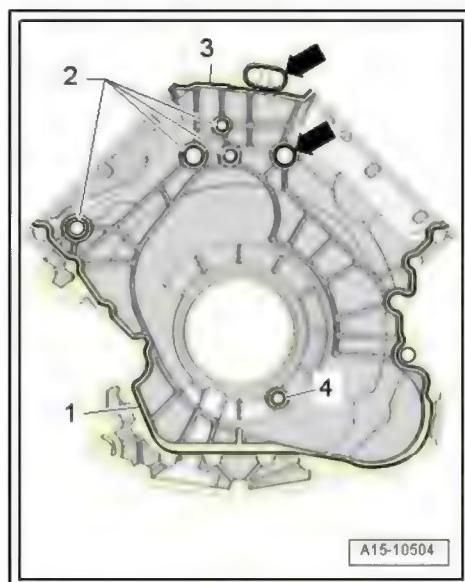


Caution

Make sure lubrication system is not clogged by excess sealant.

- ◆ The sealant bead must not be thicker than specified.

- Apply sealant beads -1 ... 4- onto the clean sealing surfaces of the timing chain cover (bottom) as illustrated.
- The groove on the sealing surface must be completely filled with sealant.
- The beads of sealant must project 1.5 ... 2.0 mm above the sealing surface.
- Apply sealant -3- in a continuous bead as shown in illustration (although groove is not continuous).



Note

The timing chain cover must be installed within 5 minutes after applying sealant.

- Insert seals -arrows- in grooves on timing chain cover (bottom).

Timing chain cover (bottom), version 2

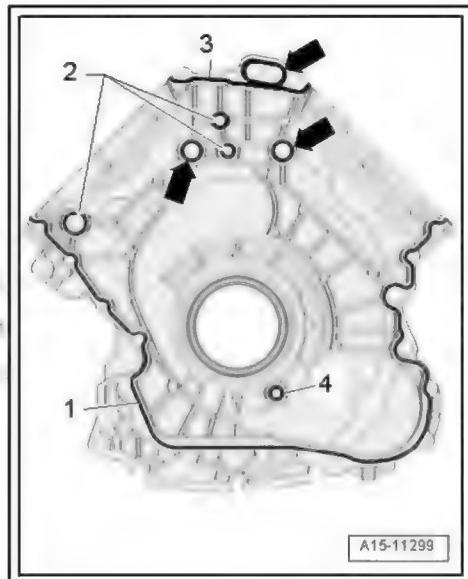


Caution

Make sure lubrication system is not clogged by excess sealant.

- ◆ *The sealant beads must not be thicker than specified.*

- Apply sealant beads -1...4- onto the clean sealing surfaces of the timing chain cover (bottom) as illustrated.
- The groove on the sealing surface must be completely filled with sealant.
- The beads of sealant must project 1.5 ... 2.0 mm above the sealing surface.
- Apply sealant -3- in a continuous bead as shown in illustration (although groove is not continuous).



Note

The timing chain cover must be installed within 5 minutes after applying the sealant.

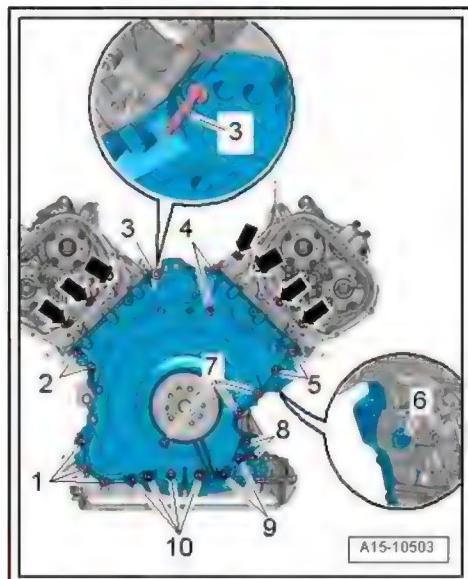
- Insert seals -arrows- in grooves on timing chain cover (bottom).

All versions (continued):

- Fit timing chain cover (bottom), guiding it towards the sealing surface on cylinder block and cylinder head at an angle and from below.
- Take care not to damage the cylinder head gaskets when fitting the cover.
- Tighten bolts for timing chain cover (bottom) [⇒ page 108](#).

Remaining installation steps are carried out in reverse sequence; note the following:

- Install crankshaft oil seal (gearbox end) [⇒ page 87](#).
- Install oil filter housing [⇒ page 196](#).
- Install timing chain covers (left and right) [⇒ page 109](#).
- Install drive plate [⇒ page 84](#).
- Install coolant pipe (top) [⇒ page 232](#).
- Install supercharger [⇒ page 259](#).
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 411.



Tightening torques

- ◆ [⇒ Fig. "Timing chain cover \(bottom\) - tightening torque and sequence" , page 108](#)
- ◆ [⇒ Electrical system; Rep. gr. 27 ; Starter; Exploded view - starter](#)

2 Chain drive

- ⇒ [“2.1 Exploded view - camshaft timing chains”, page 118](#)
- ⇒ [“2.2 Exploded view - drive chain for valve gear”, page 121](#)
- ⇒ [“2.3 Exploded view - drive chain for balance shaft and oil pump”, page 122](#)
- ⇒ [“2.4 Removing camshaft timing chain from camshafts”, page 123](#)
- ⇒ [“2.5 Removing and installing camshaft timing chain”, page 135](#)
- ⇒ [“2.6 Removing and installing drive chain for valve gear”, page 137](#)
- ⇒ [“2.7 Removing and installing drive chain for balance shaft and oil pump”, page 138](#)

2.1 Exploded view - camshaft timing chains

Camshaft timing chain (left-side)

1 - Bolt

- Renew
- 80 Nm +90°

2 - Bolt

- Renew
- 80 Nm +90°

3 - Camshaft chain sprocket

- For exhaust camshaft
- Removing and installing
⇒ [“2.4 Removing camshaft timing chain from camshafts”, page 123](#)

4 - Camshaft adjuster

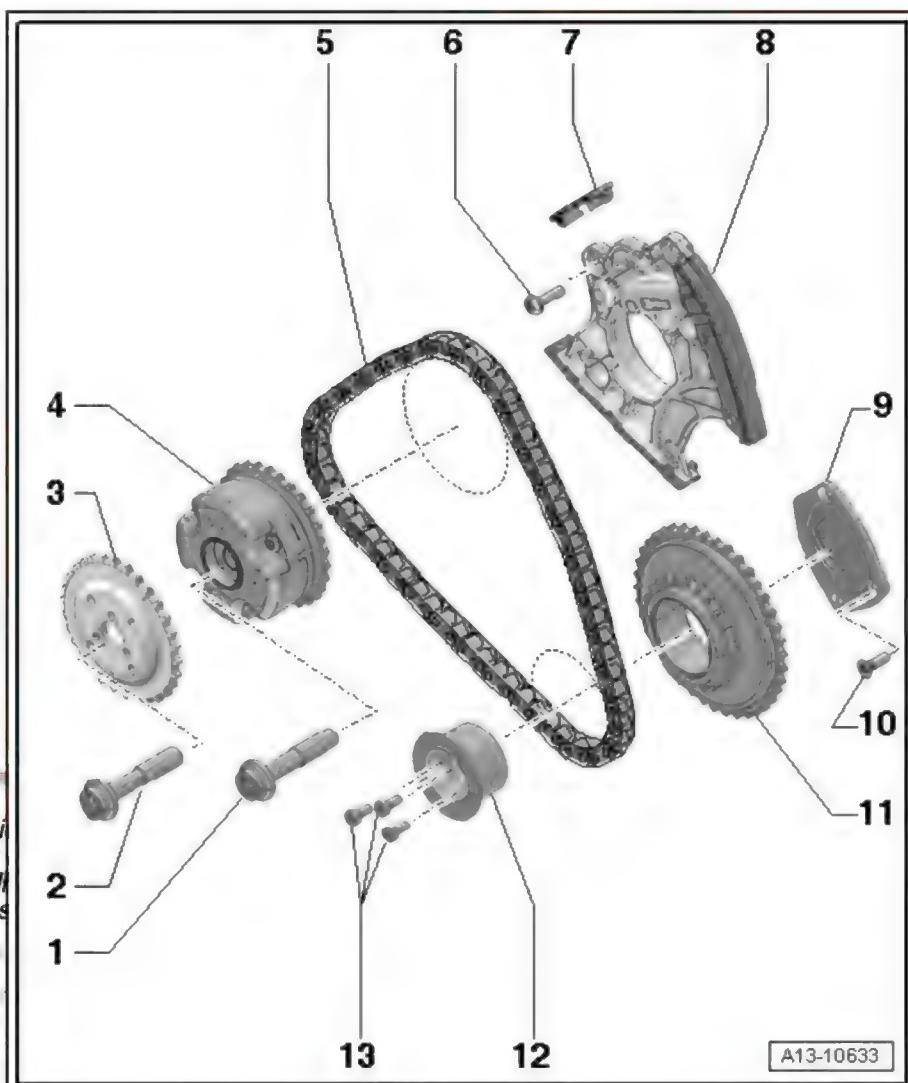
- For inlet camshaft
- Identification “Intake”
- Removing and installing
⇒ [“2.4 Removing camshaft timing chain from camshafts”, page 123](#)



Depending on the version, the camshaft adjuster may have two or four recesses. The illustration shows a camshaft adjuster with four recesses.

5 - Camshaft timing chain (left-side)

- Mark direction of rotation for re-installation with a paint marker
- Removing from camshafts ⇒ [“2.4 Removing camshaft timing chain from camshafts”, page 123](#)



- Removing and installing ⇒ [“2.5 Removing and installing camshaft timing chain”, page 135](#)

6 - Bolt

- 9 Nm

7 - Slide

8 - Chain tensioner

- For camshaft timing chain (left-side)
- Removing and installing ⇒ [“2.4 Removing camshaft timing chain from camshafts”, page 123](#)

9 - Bearing plate

- For drive chain sprocket

10 - Bolt

- Tightening torque ⇒ [Item 10 \(page 121\)](#)

11 - Drive chain sprocket

- For camshaft timing chain (left-side)

12 - Bearing mounting

- For drive chain sprocket for camshaft timing chain (left-side)

13 - Bolts

- Tightening torque ⇒ [Item 3 \(page 121\)](#)

Camshaft timing chain (right-side)

1 - Bolt

- Renew
- 80 Nm +90°

2 - Camshaft chain sprocket

- For exhaust camshaft
- Removing and installing
⇒ ["2.4 Removing camshaft timing chain from camshafts", page 123](#)

3 - Bolt

- Renew
- 80 Nm +90°

4 - Camshaft adjuster

- For inlet camshaft
- Identification "Intake"
- Removing and installing
⇒ ["2.4 Removing camshaft timing chain from camshafts", page 123](#)



Note

Depending on the version, the camshaft adjuster may have two or four recesses. The illustration shows a camshaft adjuster with four recesses.

5 - Bolt

- Tightening torque ⇒ [Item 15 \(page 122\)](#)

6 - Bearing mounting

- For drive chain sprocket for camshaft timing chain (right-side)
- Asymmetric version
- Installation position ⇒ Fig. ["Installation position: bearing mounting for drive sprocket for camshaft timing chain \(right-side\)"](#), page 122

7 - Drive chain sprocket

- For camshaft timing chain (right-side)
- Installation position ⇒ Fig. ["Installation position: bearing mounting for drive sprocket for camshaft timing chain \(right-side\)"](#), page 122

8 - Camshaft timing chain (right-side)

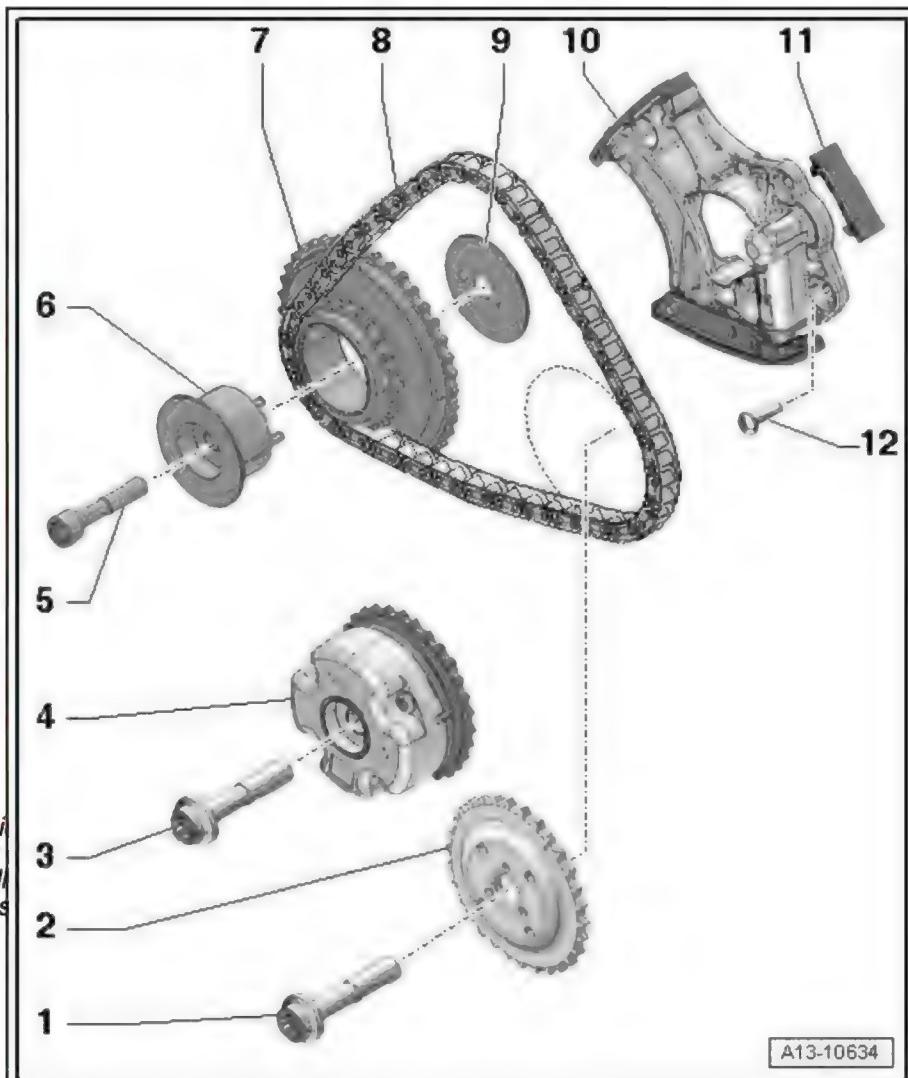
- Mark direction of rotation for re-installation with a paint marker
- Removing from camshafts ⇒ ["2.4 Removing camshaft timing chain from camshafts", page 123](#)
- Removing and installing ⇒ ["2.5 Removing and installing camshaft timing chain", page 135](#)

9 - Thrust washer

- For drive chain sprocket for camshaft timing chain (right-side)
- Asymmetric version
- Installation position ⇒ Fig. ["Installation position: bearing mounting for drive sprocket for camshaft timing chain \(right-side\)"](#), page 122

10 - Chain tensioner

- For camshaft timing chain (right-side)



A13-10634

Removing and installing ⇒ "2.4 Removing camshaft timing chain from camshafts", page 123

11 - Slide

12 - Bolt

9 Nm

2.2 Exploded view - drive chain for valve gear

1 - Guide rail

2 - Bolt

- Renew
- 10 Nm +90°

3 - Bolts

- Renew
- 5 Nm +60°

4 - Bearing mounting

- For drive chain sprocket

5 - Drive chain sprocket

- For timing chain (left-side)

6 - Bolt

- Renew
- 10 Nm +90°

7 - Drive chain

- For timing drive
- Mark direction of rotation for re-installation with a paint marker
- Removing and installing
⇒ "2.6 Removing and installing drive chain for valve gear", page 137

8 - Bolt

- Renew
- 10 Nm +90°

9 - Guide rail

10 - Bolt

- Renew
- 8 Nm +45°

11 - Bearing plate

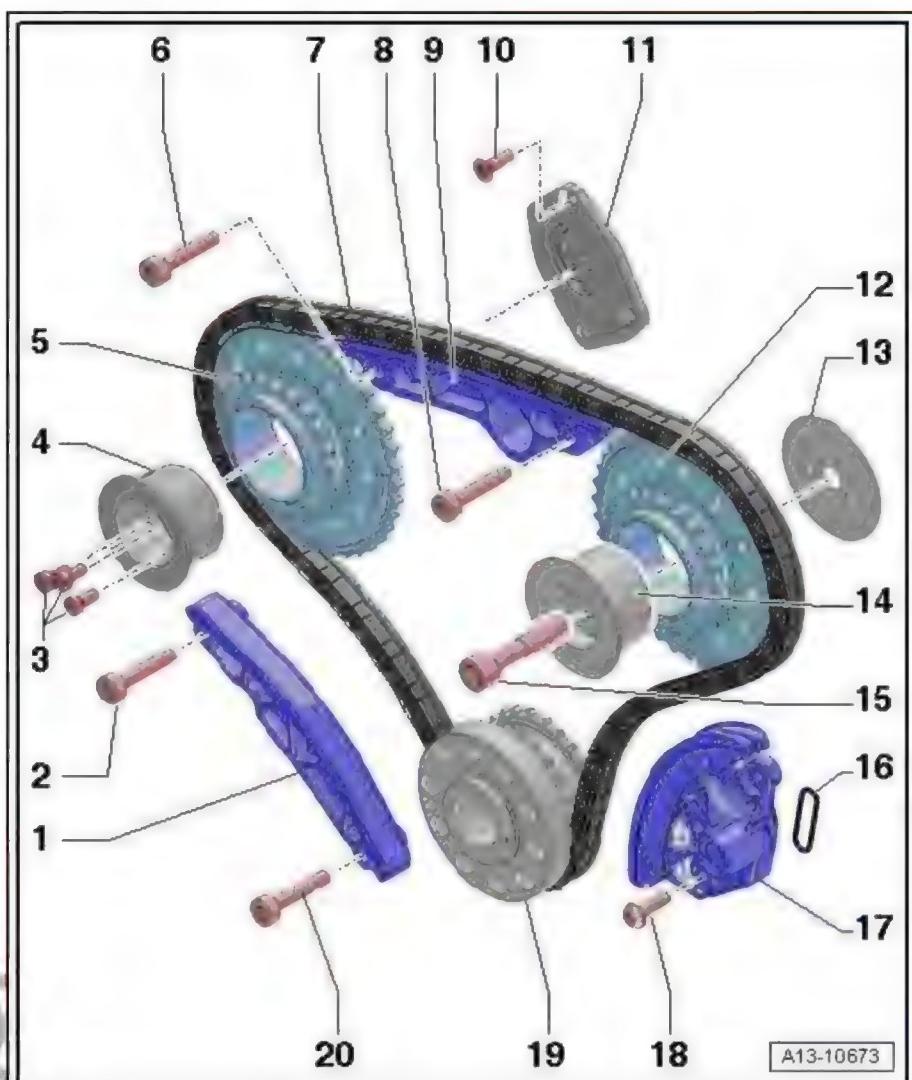
- For drive chain sprocket for camshaft timing chain (right-side)
- Asymmetric version

12 - Drive chain sprocket

- For timing chain (right-side)
- Installation position ⇒ Fig. "Installation position: bearing mounting for drive sprocket for camshaft timing chain (right-side)" , page 122

13 - Thrust washer

- Asymmetric version



- Installation position [⇒ Fig. “Installation position: bearing mounting for drive sprocket for camshaft timing chain \(right-side\)”](#), page 122

14 - Bearing mounting

- For drive chain sprocket
- Asymmetric version
- Installation position [⇒ Fig. “Installation position: bearing mounting for drive sprocket for camshaft timing chain \(right-side\)”](#), page 122

15 - Bolt

- Renew
- 30 Nm +90°

16 - Seal

- Renew

17 - Chain tensioner

- Removing and installing [⇒ “2.6 Removing and installing drive chain for valve gear”, page 137](#)

18 - Bolt

- 9 Nm

19 - Crankshaft

20 - Bolt

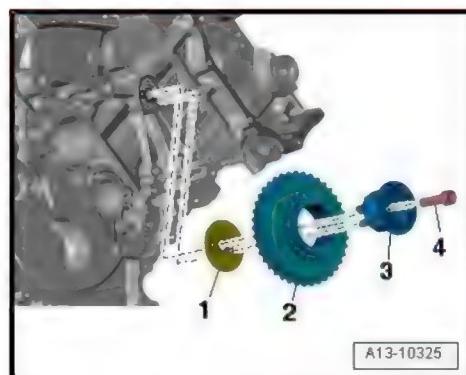
- Renew
- 10 Nm +90°

Installation position: bearing mounting for drive sprocket for camshaft timing chain (right-side)

- Dowel pins in bearing mounting -3- for drive sprocket for camshaft timing chain (right-side) must engage in drillings in thrust washer -1- and in cylinder block drillings.

2 - Drive sprocket for camshaft timing chain (right-side)

4 - Bolt



2.3 Exploded view - drive chain for balance shaft and oil pump

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1 - Crankshaft

2 - Drive chain

- For auxiliary drives
- Mark direction of rotation for re-installation with a paint marker
- Removing and installing
⇒ "2.7 Removing and installing drive chain for balance shaft and oil pump", page 138

3 - Drive chain sprocket

- For oil pump
- Installation position:
Side with lettering faces engine

4 - Bolt

- Renew
- 30 Nm +90°

5 - Compression spring

6 - Bolt

- Renew
- 15 Nm +90°

7 - Chain sprocket for balance shaft

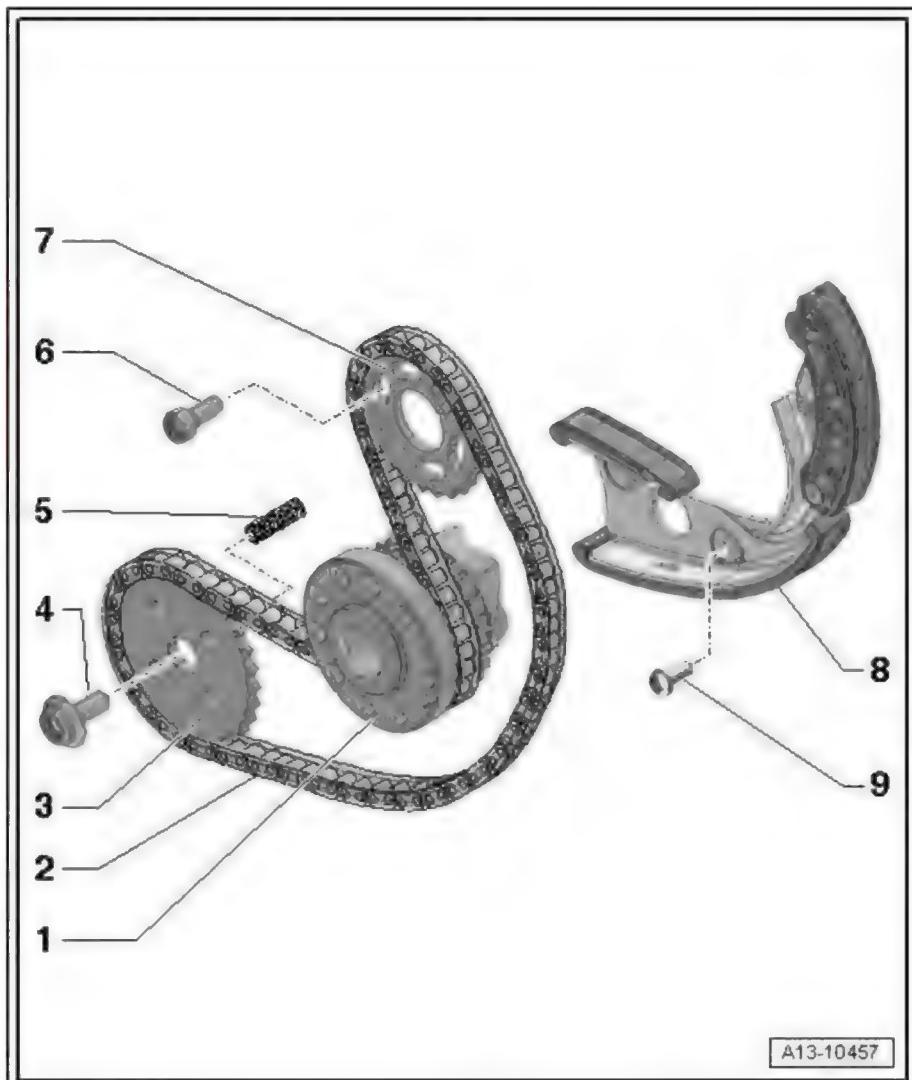
- Installation position:
Side with lettering faces gearbox

8 - Chain tensioner

- With guide rail

9 - Bolt

- Renew
- 10 Nm +45°

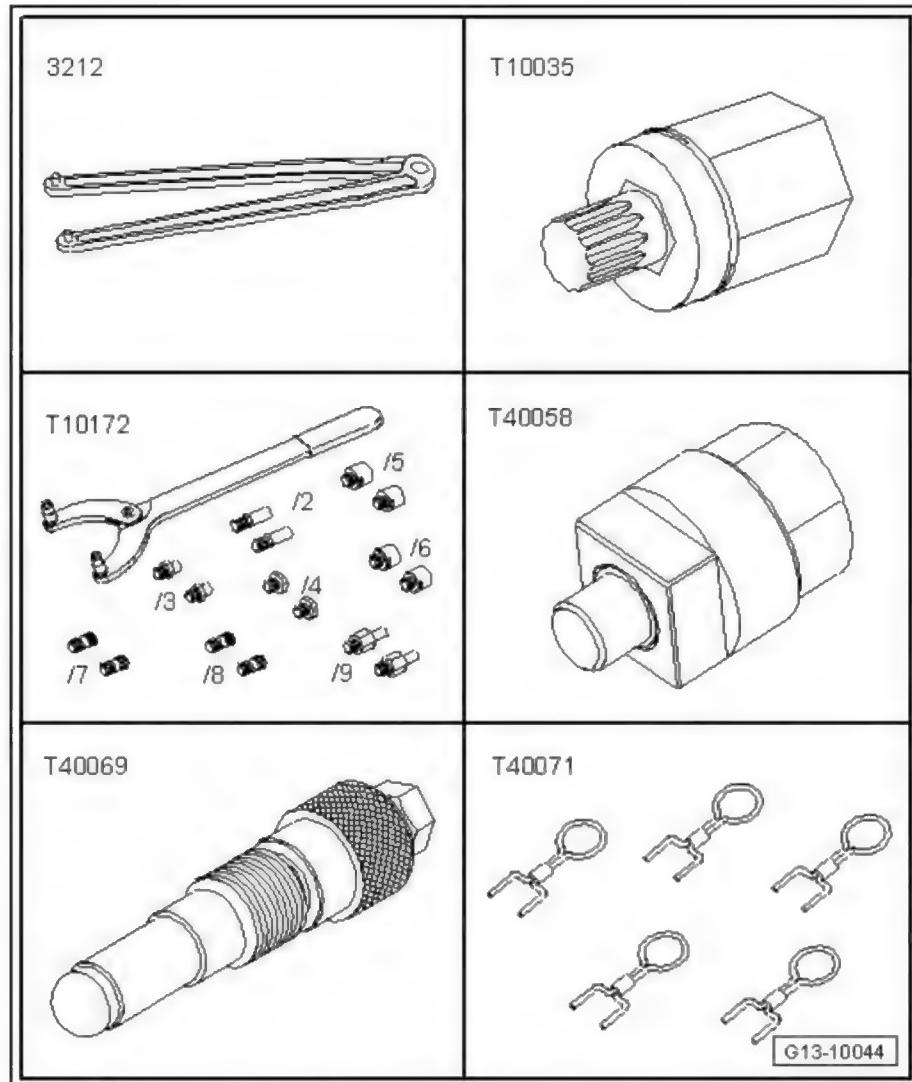


2.4 Removing camshaft timing chain from camshafts



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Special tools and workshop equipment required



- ◆ Pin wrench - 3212-
- ◆ Socket - T10035-
- ◆ Counterhold tool - T10172- with -T10172/2-
- ◆ Adapter - T40058-
- ◆ Locking pin - T40069-
- ◆ 2x Locking pin - T40071-

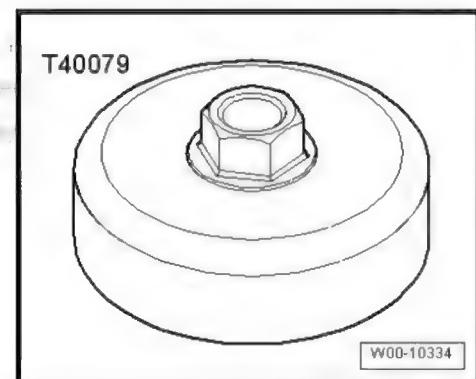
◆ Used oil collection and extraction unit - VAS 6622A-



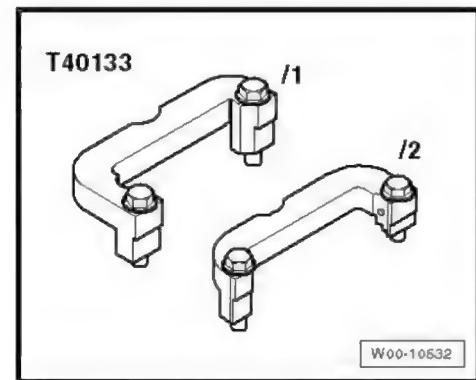
- ◆ Special wrench - T40269- for camshaft adjuster with three recesses



- ◆ Special wrench - T40079- for camshaft adjuster with 4 recesses



- ◆ 2x Camshaft clamp - T40133-



Removing



WARNING

Risk of injury as the radiator fans may start up automatically.

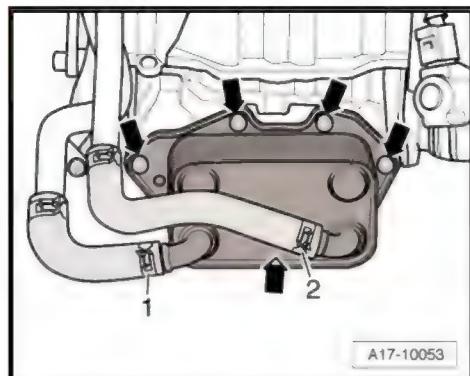
- ◆ Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.



Note

- ◆ In the following procedure the camshaft timing chains remain on the engine.
 - ◆ Even when working on one cylinder head only, the procedure must still be carried out on both cylinder banks.
- Remove timing chain covers (left and right) [⇒ page 109](#).

- Remove cylinder head cover (left and right) ⇒ [page 151](#) .
- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Detach poly V-belt from tensioner ⇒ [“1.2.2 Removing and installing poly V-belt for ancillaries”, page 73](#) .
- Position used oil collection and extraction unit - VAS 6622A- below engine.
- Remove bolts -arrows- and tie up engine oil cooler to one side with coolant hoses -1, 2- attached.



WARNING

Risk of injury caused by refrigerant.

- ◆ The air conditioner refrigerant circuit must not be opened.

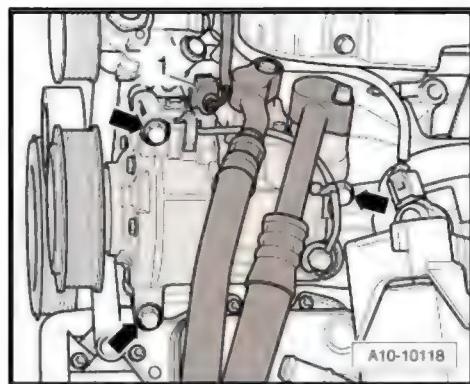
- Remove bolts -arrows- for air conditioner compressor.



Caution

Risk of damage to refrigerant lines and hoses.

- ◆ Do NOT stretch, kink or bend refrigerant lines and hoses.



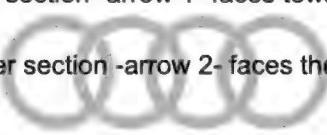
- Detach air conditioner compressor from bracket and tie up on longitudinal member (left-side) with lines/wiring connected.



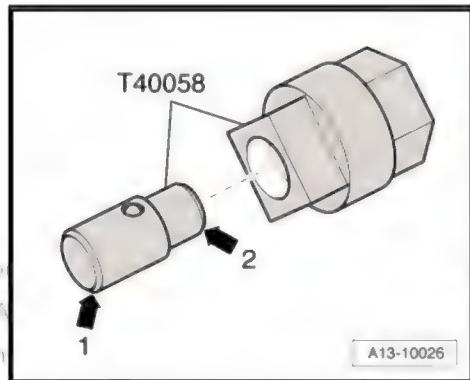
Note

Disregard -item 1-.

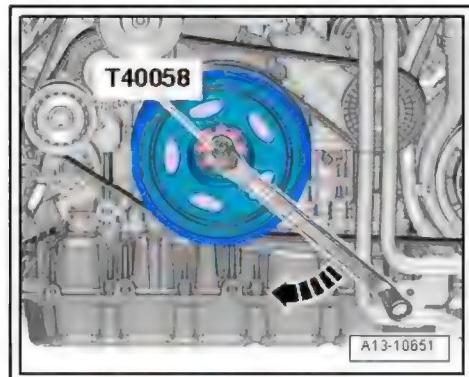
- Insert guide pin of adapter -T40058- as follows:
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



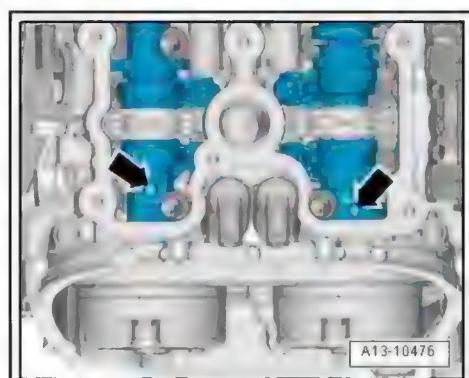
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- Use adapter - T40058- and angled ring spanner to turn crankshaft in direction of engine rotation -arrow- to "TDC".



- The threaded holes -arrows- in the camshafts must face upwards.

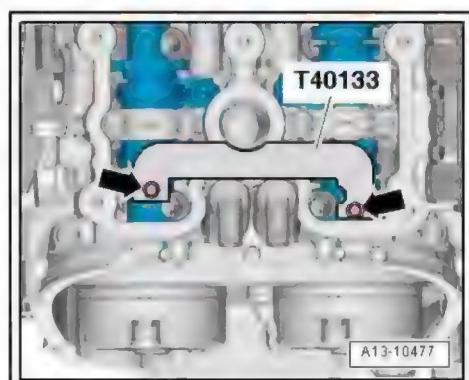


- Fit camshaft clamps - T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm.

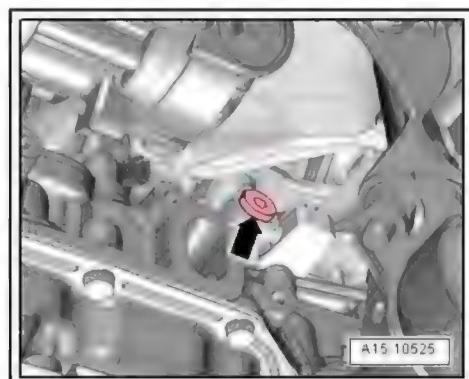
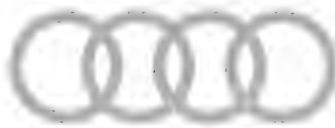


Note

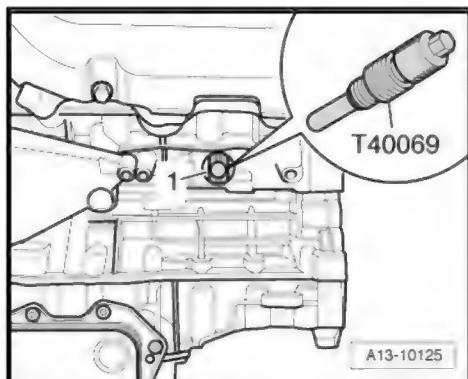
The illustration shows the left-side cylinder head.



- Remove plug -arrow- for crankshaft "TDC" marking from cylinder block.



- Screw locking pin - T40069- into hole (20 Nm); if necessary, turn crankshaft - 1- backwards and forwards slightly to fully centralise locking pin.



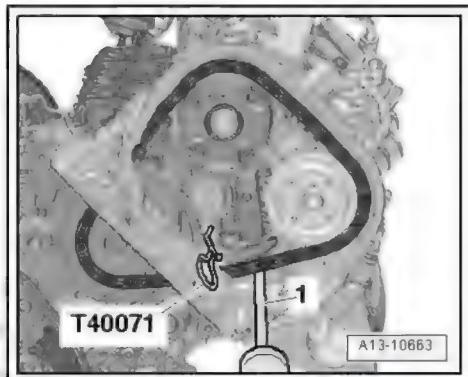
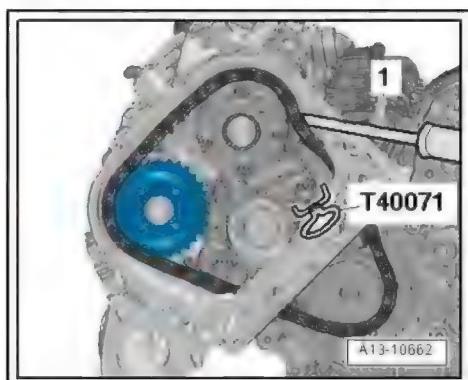
Note

Chain tensioners for camshaft timing chain are oil-damped and can only be compressed slowly by applying constant pressure.

- Press guide rail of chain tensioner for camshaft timing chain (left-side) inwards as far as the stop using a screwdriver - 1-. Then lock chain tensioner by inserting locking pin - T40071- .
- Press guide rail of chain tensioner for camshaft timing chain (right-side) inwards as far as the stop using a screwdriver - 1-. Then lock chain tensioner by inserting locking pin - T40071- .



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Camshaft adjusters with four recesses

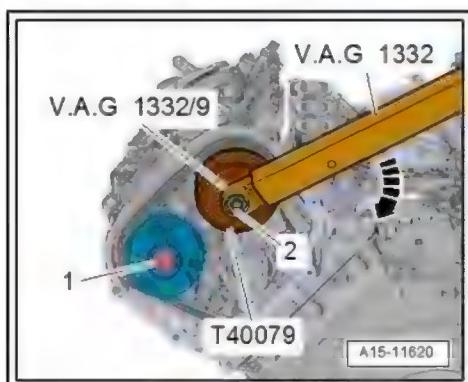


Caution

Risk of damage to camshaft if handled incorrectly

- *Never use camshaft clamp as a counterhold tool.*

- Counterhold at corresponding camshaft adjuster by applying special wrench - T40079- with torque wrench - V.A.G 1332- and open ring spanner insert - V.A.G 1332/9-, and loosen bolt -2-.



Note

Disregard -item 1- and -arrow-.

- Perform the same procedure on the opposite cylinder bank.

Camshaft adjusters with three recesses

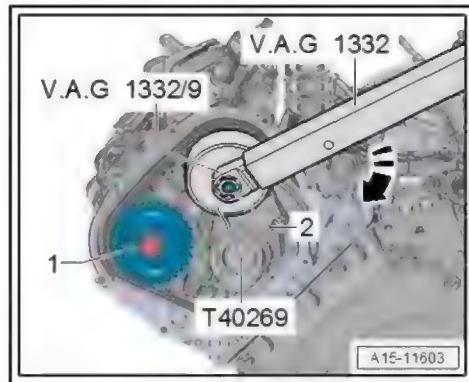


Caution

Risk of damage to camshaft if handled incorrectly

- *Never use camshaft clamp as a counterhold tool.*

- Counterhold at corresponding camshaft adjuster by applying special wrench - T40269- with torque wrench - V.A.G 1332- and open ring spanner insert - V.A.G 1332/9-, and loosen bolt -2-.



Note

Disregard item -1- and -arrow-.

- Perform the same procedure on the opposite cylinder bank.

All vehicles (continued)

- Counterhold at corresponding camshaft sprocket by applying counterhold tool - T10172A- with adapter - T10172/10- and loosen bolt with special wrench - T10035- .



Note

Disregard -arrow-.

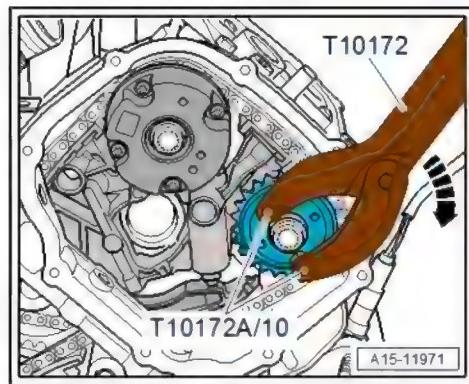
- Perform the same procedure on the opposite cylinder bank.



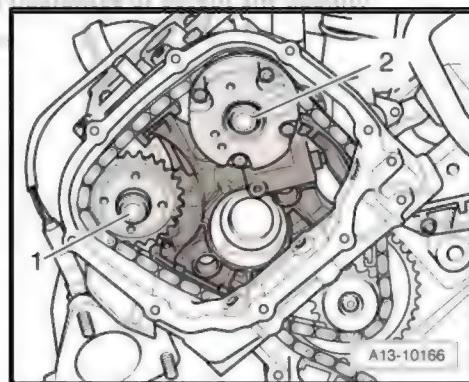
Caution

Risk of irreparable damage to engine.

- ◆ *Block off the opening in the valve timing housing with a clean cloth to prevent small items from dropping into the engine.*



- Use paint to mark allocation of camshaft adjuster and camshaft sprocket to corresponding cylinder head for re-installation.
- Unscrew bolts -1- and -2- on cylinder head (left-side) and remove camshaft adjuster and camshaft sprocket.



- Unscrew bolts -1- and -2- on cylinder head (right-side) and remove camshaft adjuster and camshaft sprocket.

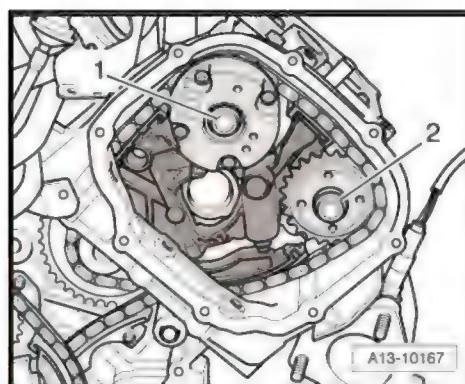
Installing

- Tightening torques [⇒ "2.1 Exploded view - camshaft timing chains", page 118](#)



Note

Renew the bolts tightened with specified tightening angle.



Caution

Risk of damage to valves and piston crowns.

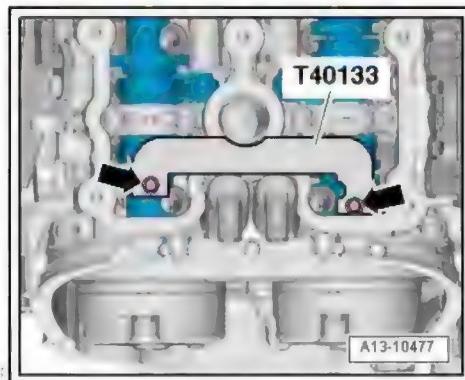
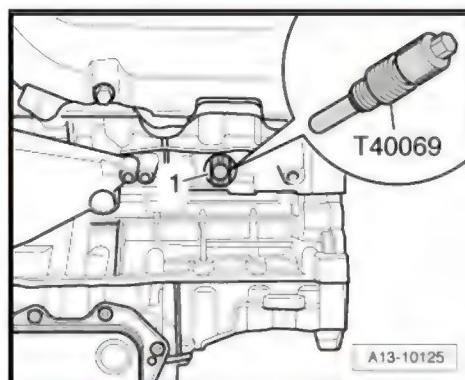
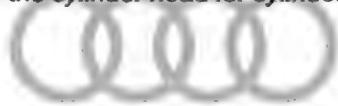
- ◆ The crankshaft must not be at "TDC" at any cylinder when the camshafts are turned.

- Drive chain for valve gear installed [⇒ "2.6 Removing and installing drive chain for valve gear", page 137](#)
- Crankshaft -1- locked in "TDC" position with locking pin - T40069- .
- Camshafts on both cylinder heads locked in "TDC" position -arrows- with camshaft clamp - T40133- (25 Nm).



Note

Illustration shows the cylinder head for cylinder bank 2 (left-side).



When assembling, note the following:

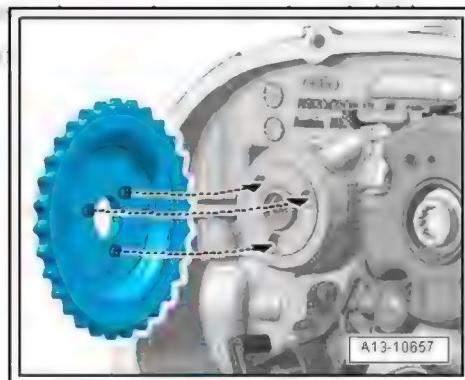


Caution

Risk of damage to engine.

- ◆ The camshaft sprockets MUST be installed as described in the following work steps:

- Fit camshaft sprockets according to marks applied when removing.



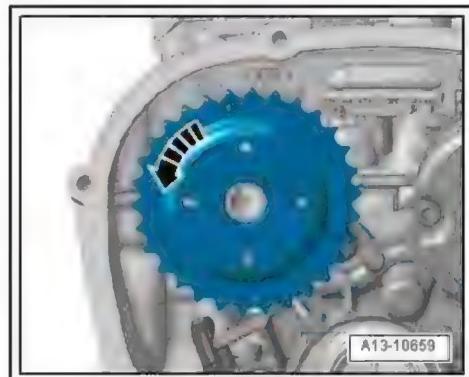
- When fitting camshaft sprockets, make sure that the lugs on the camshaft sprockets engage in the slots on the camshafts -arrows-.



Note

Illustration shows the cylinder head for cylinder bank 2 (left-side).

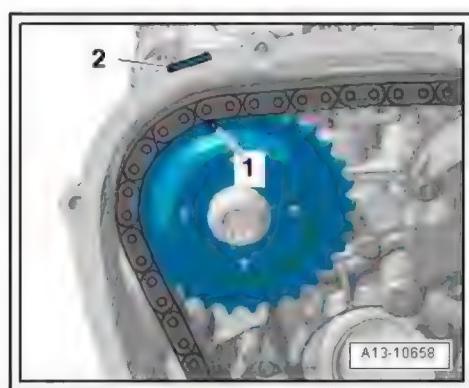
- Perform the same procedure on the opposite cylinder bank.
- Turn camshaft sprocket on camshaft anti-clockwise onto stop -arrow-.



Note

Illustration shows the cylinder head for cylinder bank 2 (left-side).

- Perform the same procedure on the opposite cylinder bank.

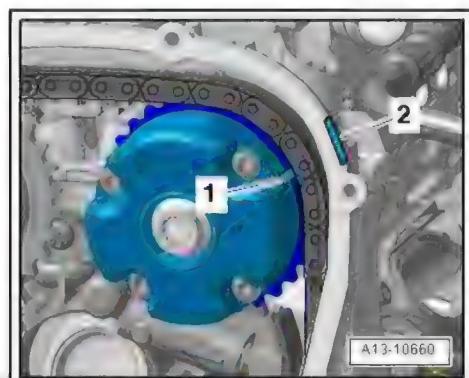


- Dot -1- should align with adjustment window -2-.



Note

- ♦ *Illustration shows the cylinder head for cylinder bank 2 (left-side).*
- ♦ *Disregard the camshaft timing chain in the illustration.*
- Perform the same procedure on the opposite cylinder bank.



Caution

Risk of damage to engine.

- ♦ *The camshaft adjusters MUST be installed as described in the following work steps:*

- Fit camshaft adjusters according to marks applied during removal.
- Groove -1- on camshaft adjuster should align with adjustment window -2-.



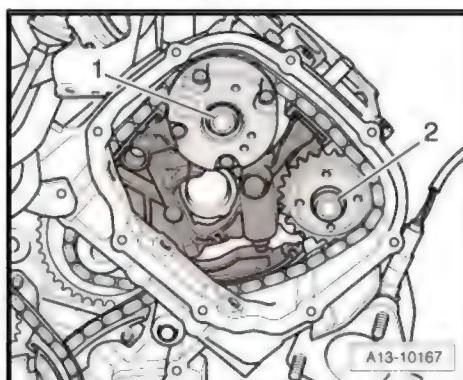
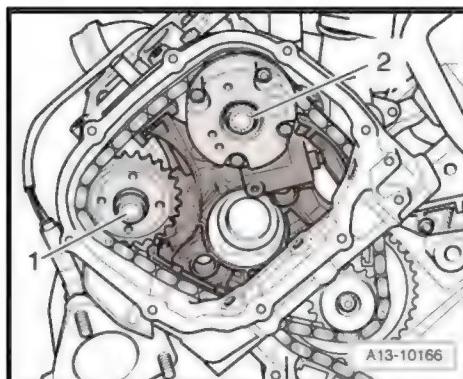
Note

- ♦ *Illustration shows the cylinder head for cylinder bank 1 (right-side).*
- ♦ *Disregard the camshaft timing chain in the illustration.*
- Perform the same procedure on the opposite cylinder bank.

Installation (continued)

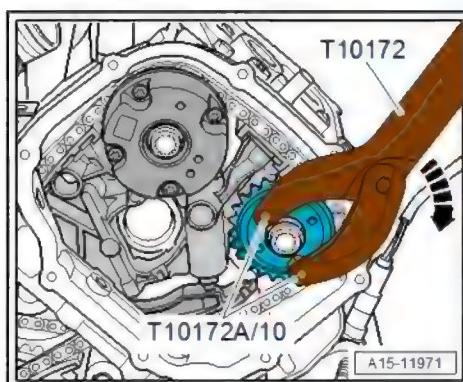
- Re-install camshaft adjusters on cylinder head (left-side) in the same position as before (pay attention to marks applied when removing).
- Fit camshaft timing chain (left-side) onto drive sprocket, camshaft adjuster and camshaft sprocket and fit bolts -1- and -2- without tightening.
- It should just be possible to turn the camshaft adjuster and camshaft sprocket on the camshaft without axial movement.
- Remove locking pin - T40071- .

- Re-install camshaft adjuster on cylinder head (right-side) in the same position as before (pay attention to marks applied when removing).
- Fit camshaft timing chain (right-side) onto drive sprocket, camshaft adjuster and camshaft sprocket and fit bolts -1- and -2- without tightening.
- It should just be possible to turn the camshaft adjuster and camshaft sprocket on the camshaft without axial movement.
- Remove locking pin - T40071- .



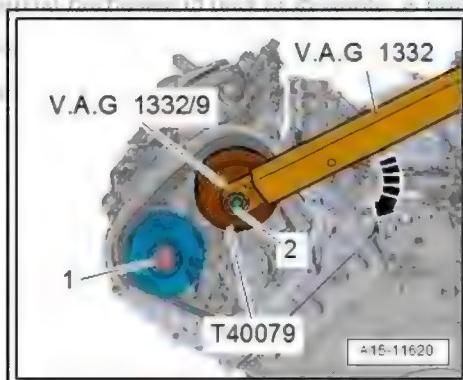
- Apply counterhold tool - T10172A- with adapter - T10172/10- to camshaft sprocket of exhaust camshaft (right-side).
- Have a 2nd mechanic apply tension to camshaft timing chain by pressing camshaft sprocket in direction of -arrow-.
- Tighten bolts as follows while keeping camshaft sprocket under tension:

Stage	Bolt	Tightening torque
1.	On exhaust camshaft	80 Nm
1.	On inlet camshaft	80 Nm



Camshaft adjusters with four recesses

- Fit special wrench - T40079- onto camshaft adjuster of inlet camshaft (left-side).
- Apply torque wrench - V.A.G 1332- with open ring spanner insert - V.A.G 1332/9- to special wrench - T40079- .
- Have a second mechanic apply approx. 40 Nm of tension to camshaft timing chain by pressing torque wrench - V.A.G 1332- in direction of -arrow-.



Camshaft adjusters with three recesses

- Fit special wrench -T40269- onto camshaft adjuster of inlet camshaft (left-side).
- Apply torque wrench - V.A.G 1332- with open ring spanner insert - V.A.G 1332/9- to special wrench -T40269- .
- Have a second mechanic apply tension to camshaft timing chain by pressing torque wrench - V.A.G 1332- in direction of -arrow-.

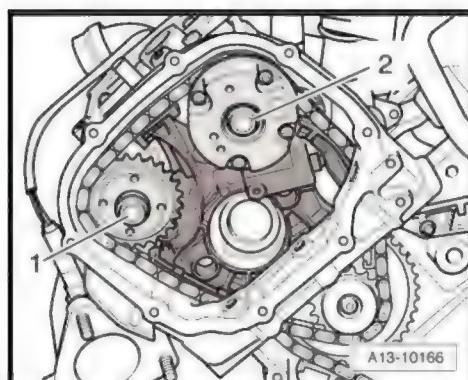
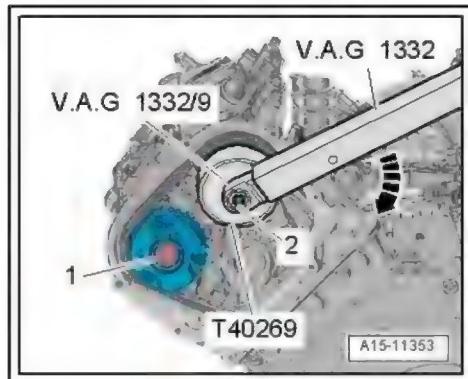
All vehicles (continued)

- Tighten bolts as follows while keeping camshaft adjuster under tension:

Stage	Bolt	Tightening torque
1.	-1-	On exhaust camshaft: 80 Nm
1.	-2-	On inlet camshaft: 80 Nm

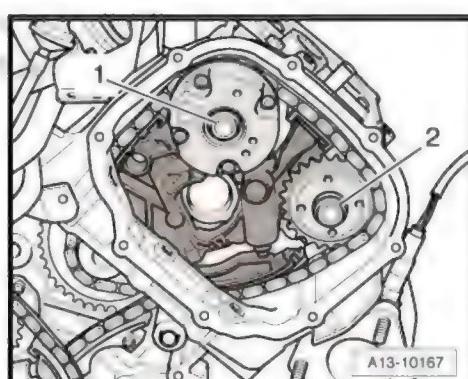
- Tighten bolts securing camshaft adjuster and camshaft sprocket on cylinder head (left-side) as follows:

Stage	Bolt	Tightening torque
2.	-1-	Tighten on exhaust camshaft to final tightening torque ⇒ Item 2 (page 118)
2.	-2-	Tighten on inlet camshaft to final tightening torque ⇒ Item 1 (page 118)



- Tighten bolts securing camshaft adjuster and camshaft sprocket on cylinder head (right-side) as follows:

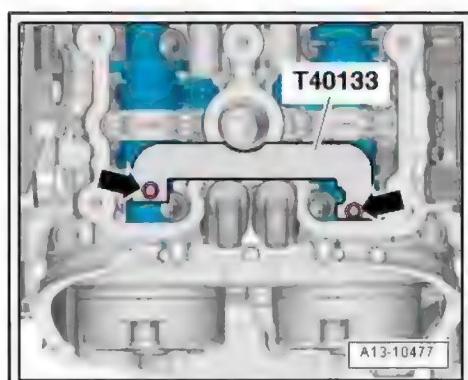
Stage	Bolt	Tightening torque
2.	-1-	Tighten on inlet camshaft to final tightening torque ⇒ Item 3 (page 120)
2.	-2-	Tighten on exhaust camshaft to final tightening torque ⇒ Item 1 (page 120)



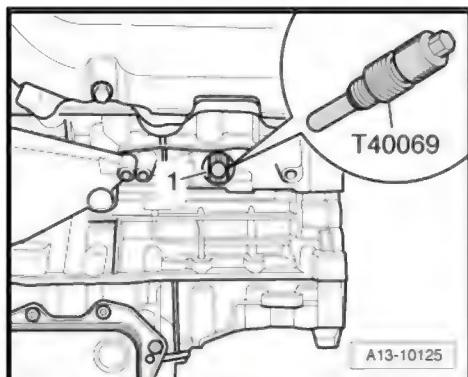
- Remove camshaft clamps - T40133- from both cylinder heads -arrows-.



Illustration shows the cylinder head for cylinder bank 2 (left-side).



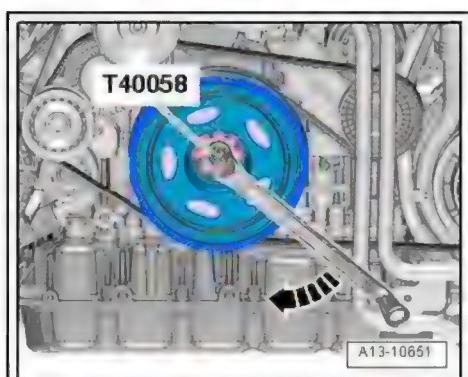
- Remove locking pin - T40069- .



- Using adapter - T40058- and angled ring spanner, turn crankshaft 2 revolutions in normal direction of rotation -arrow- until crankshaft is at "TDC" again.

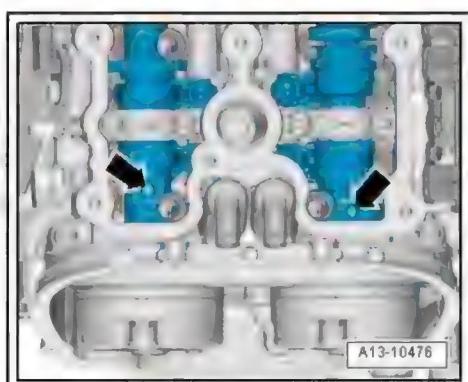
Note

If you turn the crankshaft beyond "TDC" by mistake, turn it back approx. 30° and set to "TDC" again.

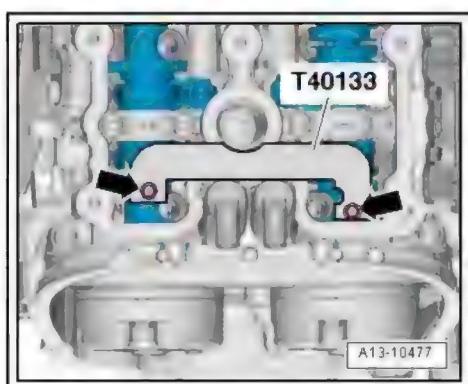


- The threaded holes -arrows- in the camshafts must face upwards.

Präzision bei Ausrichtung. Geringer Toleranzabstand zwischen 1,1 mm und 1,3 mm ist zulässig.
Vorsicht! Die Zylinderkopfmontage kann durch die Kurbelwelle beschädigt werden.
Achtung! Die Zylinderkopfmontage kann durch die Kurbelwelle beschädigt werden.



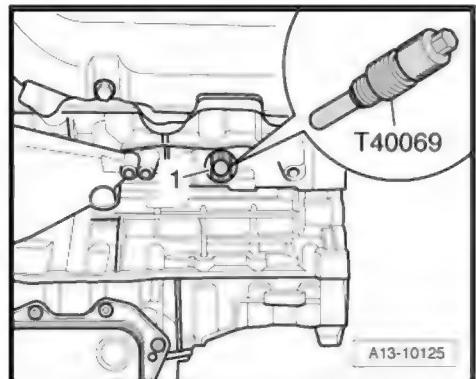
- Fit camshaft clamps - T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm.



- Screw the locking pin - T40069- directly into the hole.
- The locking pin - T40069- must engage in the locating hole in crankshaft -1-. If it does not, reset valve timing.
- Remove camshaft clamps from both cylinder heads.
- Remove locking pin.

Remaining installation steps are carried out in reverse sequence; note the following:

- Install engine oil cooler [⇒ page 187](#) .
- Install poly V-belt [⇒ page 73](#) .
- Install cylinder head covers: left-side [⇒ page 152](#) ; right-side [⇒ page 152](#) .
- Install timing chain covers (left and right) [⇒ page 109](#) .



Tightening torques

- ◆ [⇒ "2.1 Exploded view - camshaft timing chains", page 118](#)
- ◆ [⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit](#)
- ◆ [⇒ Fig. "Plug for TDC marking - tightening torque" , page 93](#)
- ◆ [⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation](#)

2.5 Removing and installing camshaft timing chain

Removing

- Gearbox removed [⇒ Rep. gr. 34](#) ; Removing and installing gearbox; Removing gearbox or [⇒ Rep. gr. 37](#) ; Removing and installing gearbox; Removing gearbox .
- Remove timing chain cover (bottom) [⇒ page 112](#) .
- Remove cylinder head covers: left-side [⇒ page 152](#) ; right-side [⇒ page 152](#) .
- Remove timing chain from camshafts on relevant side [⇒ page 123](#) .

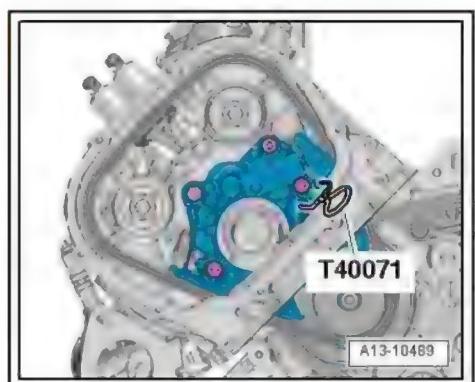


Caution

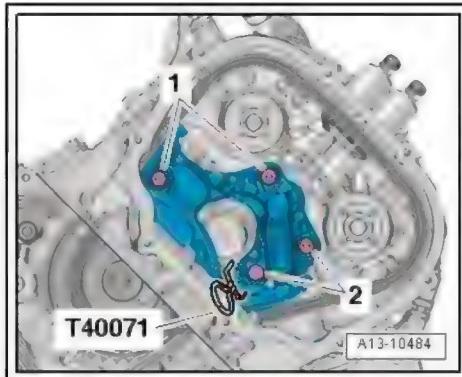
If a used timing chain rotates in the opposite direction when it is refitted, this can cause breakage.

- ◆ *Mark running direction of timing chains (left and right) with paint for re-installation. Do not attempt to mark the timing chain with a centre punch or by making a notch or similar.*

- Remove locking pin - T40071- and detach camshaft timing chain (left-side).



- Remove bolts -1- and -2- and take off chain tensioner (right-side).



- Press guide rail of chain tensioner for drive chain for valve gear in direction of -arrow- and lock chain tensioner by inserting locking pin - T40071- .
- Remove bolt -1- securing drive sprocket.
- Pull off drive sprocket with bearing mounting and lift off camshaft timing chain (right-side).

Installing



Note

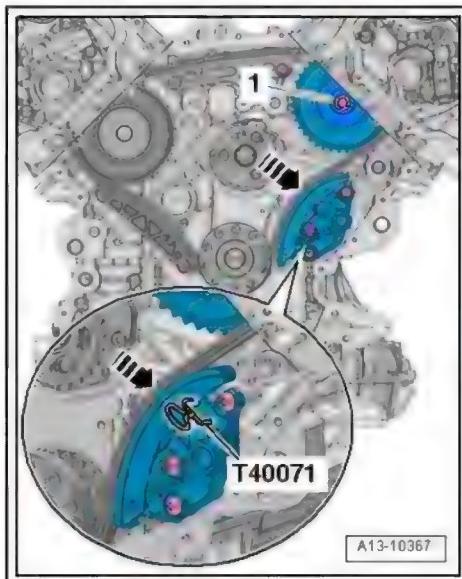
- ◆ Note the correct installation position if the tensioning element has been removed from the chain tensioner: drilling in base of housing faces chain tensioner and piston faces tensioner rail.
- ◆ Renew the bolts tightened with specified tightening angle.



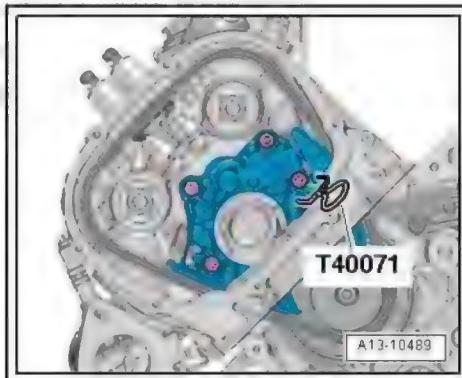
Caution

Risk of damage to valves and piston crowns.

- ◆ The crankshaft must not be at "TDC" at any cylinder when the camshafts are turned.



- Protective film on timing chain (left-side) must be applied correctly.
- Position timing chain (left-side) as shown in the illustration per (according to marks applied during removal), does not fit.
 - Press down guide rail of chain tensioner for timing chain (left-side) and lock chain tensioner by inserting locking pin - T40071- .

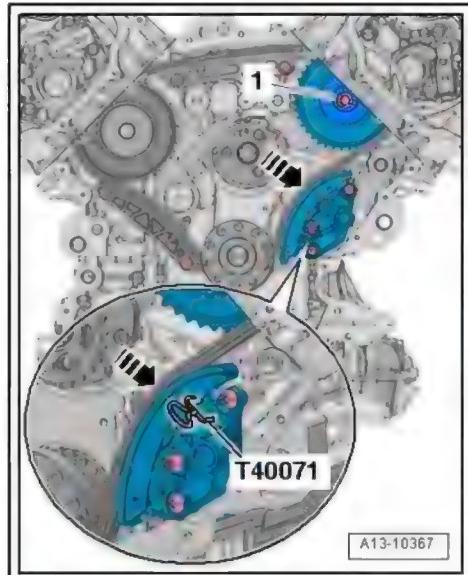


- Guide camshaft timing chain upwards to cylinder head (note marks applied during removal).
- Install drive sprocket [⇒ page 122](#).
- Tighten bolt -1- securing bearing mounting for drive chain sprocket.
- Remove locking pin - T40071- .



Note

Disregard -arrow-.



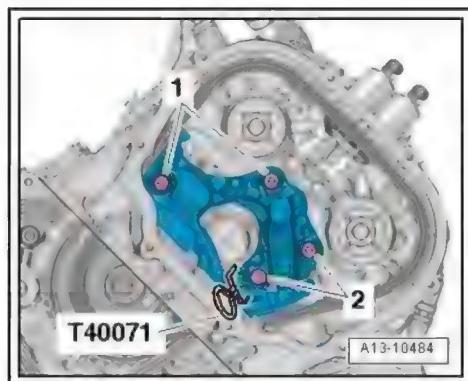
- Fit chain tensioner on cylinder head (right-side) and position timing chain.
- Tighten bolts -1- and -2-.

Remaining installation steps are carried out in reverse sequence; note the following:

- Fit timing chains on camshafts [⇒ page 123](#).
- Install timing chain cover (bottom) [⇒ page 112](#).

Tightening torques

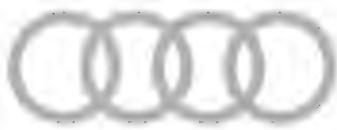
- ◆ [⇒ "2.1 Exploded view - camshaft timing chains", page 118](#)



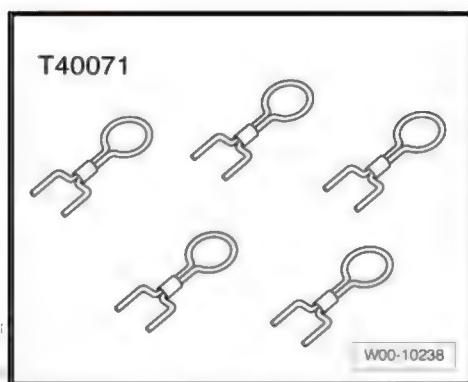
2.6 Removing and installing drive chain for valve gear

Special tools and workshop equipment required

- ◆ Locking pin - T40071-



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Removing

- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove timing chain cover (bottom) [⇒ page 112](#).
- Remove timing chains from camshafts [⇒ page 123](#).
- Remove drive chain for auxiliary drives [⇒ page 138](#).

- Press guide rail of chain tensioner for drive chain in direction of -arrow- and lock chain tensioner by inserting locking pin - T40071- .



Caution

If a used drive chain rotates in the opposite direction when it is refitted, this can cause breakage.

- ◆ *Mark running direction of drive chain with paint for re-installation. Do not attempt to mark the drive chain with a centre punch or by making a notch or similar.*

- Unscrew bolts -1- and remove guide rail.
- Remove bolts -2- and take off chain tensioner.
- Detach drive chain for valve gear.

Installing

Installation is carried out in reverse order; note the following:



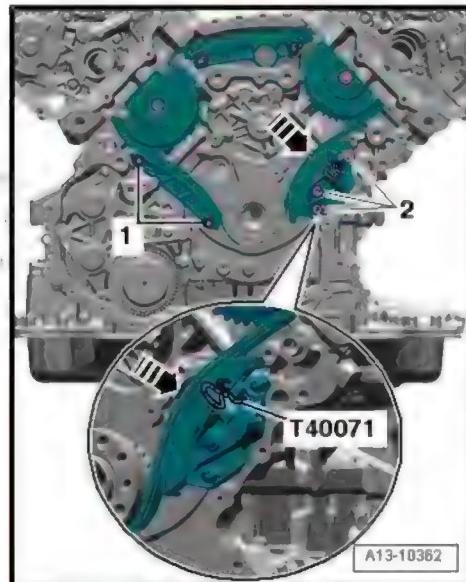
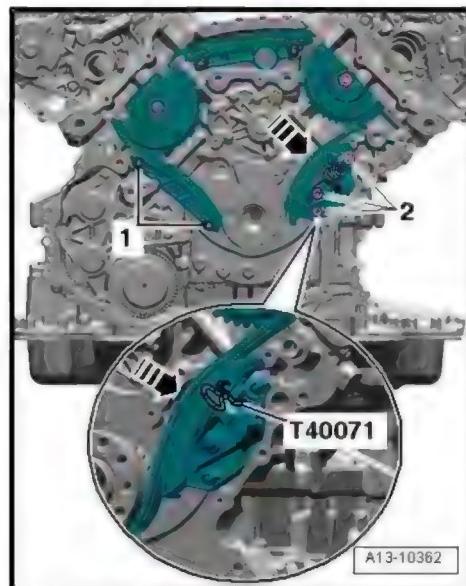
Note

Renew the bolts tightened with specified tightening angle.

- Position drive chain for valve gear onto drive chain sprockets (according to marks applied during removal).
- Install guide rail and tighten bolts -1-.
- Install chain tensioner and tighten bolts -2-.
- Press guide rail of chain tensioner for drive chain in direction of -arrow- and remove locking pin - T40071- .
- Install drive chain for auxiliary drives [⇒ page 138](#).
- Fit timing chains on camshafts [⇒ page 123](#).
- Install timing chain cover (bottom) [⇒ page 112](#).

Tightening torques

- ◆ [⇒ "2.2 Exploded view - drive chain for valve gear", page 121](#)



2.7 Removing and installing drive chain for balance shaft and oil pump

Special tools and workshop equipment required

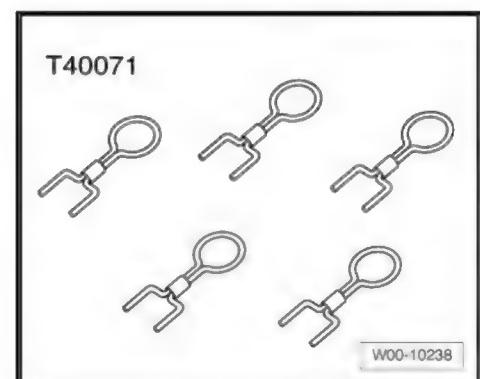
◆ Key - T40049-



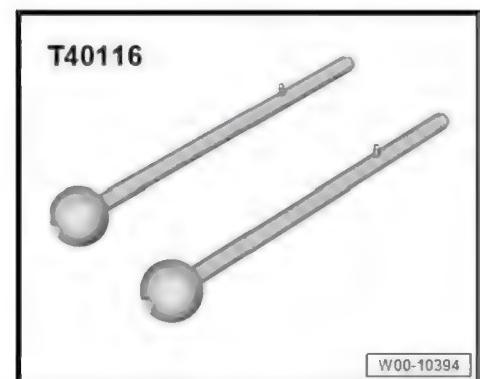
◆ Locking pin - T40069-



◆ Locking pin - T40071-



◆ Locating pins - T40116-



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Removing

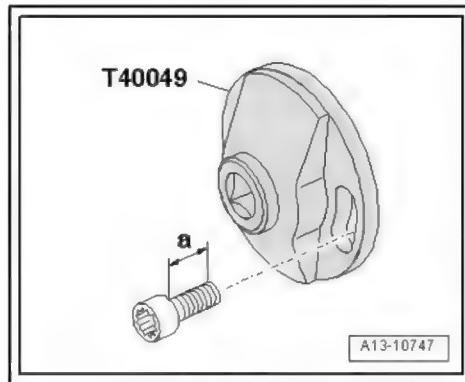
- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove timing chain cover (bottom) [⇒ page 112](#) .



Caution

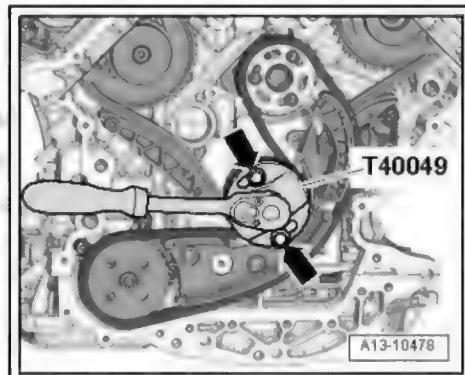
Risk of damage to drive chain if thread of bolt exceeds specified length.

- ◆ Use bolts with a maximum thread length -a- of 22 mm to attach key -T40049- .
- ◆ If no suitable bolts are available, position suitable washer (s) under bolt head so that remaining thread length does not exceed 22 mm.

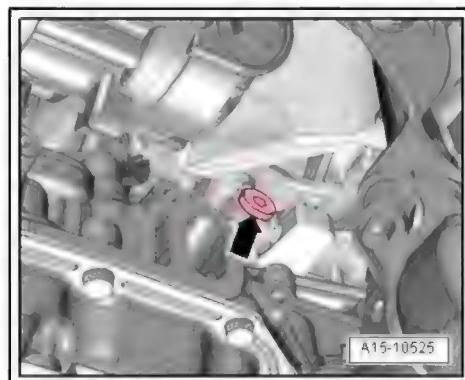


- Attach key - T40049- at rear end of crankshaft using 2 bolts -arrows-.

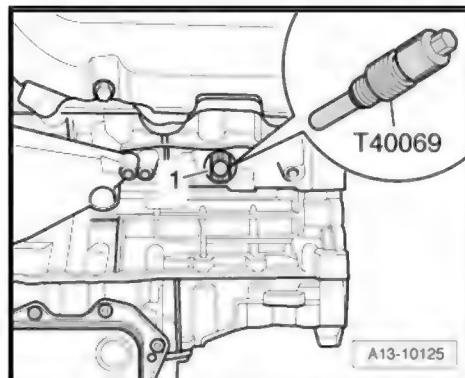
*Frontal view of engine. Crankshaft key is attached to rear end of crankshaft and secured by M10x1.0x10 (A13-10478).
 Only required to align camshafts of intermediate shafts.*



- Remove plug -arrow- for crankshaft "TDC" marking from cylinder block.
- Rotate crankshaft in normal direction of rotation to "TDC".



- Screw locking pin - T40069- into hole (20 Nm); if necessary, turn crankshaft -1- backwards and forwards slightly to fully centralise locking pin.



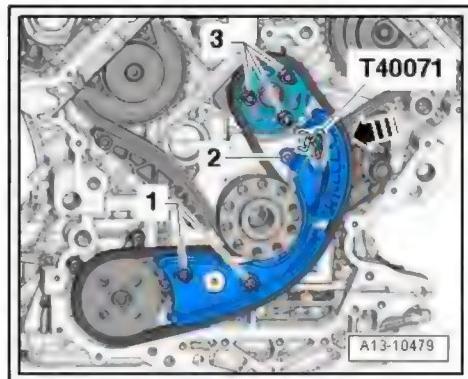
- Press guide rail of chain tensioner in direction of -arrow- and lock chain tensioner by inserting locking pin - T40071- .



Caution

If a used drive chain rotates in the opposite direction when it is refitted, this can cause breakage.

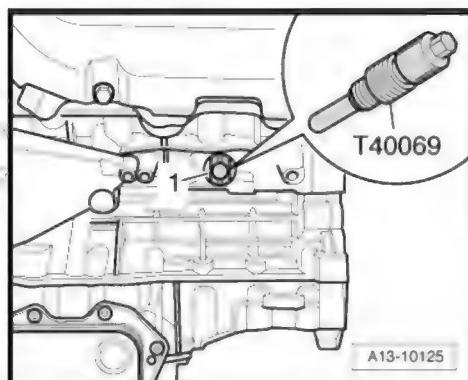
- ◆ *Mark running direction of drive chain with paint for re-installation. Do not attempt to mark the drive chain with a centre punch or by making a notch or similar.*



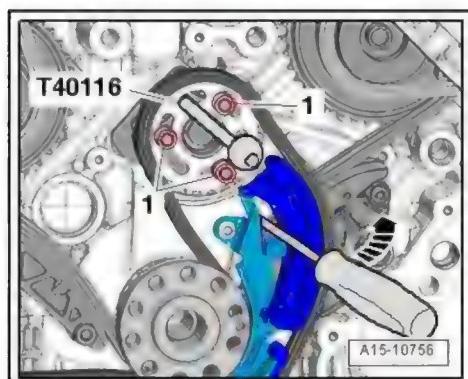
- Unscrew bolts -3- and detach chain sprocket from balance shaft.
- Remove bolts -1- and -2- and take off chain tensioner with chain.

Installing

- Crankshaft -1- locked in "TDC" position with locking pin - T40069- .



- Install chain tensioner with chain and balance shaft sprocket.
- Lock balance shaft in "TDC" position using locating pin - T40116- .
- The elongated holes in the balance shaft sprocket must be aligned centrally over the threaded holes in the balance shaft. If necessary move chain one tooth further.
- Tighten bolts for chain tensioner.
- Fit bolts -1- for chain sprocket without tightening.
- It should just be possible to turn the sprocket on the balance shaft without axial movement.
- Pull out locking pin - T40071- to release chain tensioner.
- Press against guide rail of chain tensioner -arrow- using a screwdriver, and at the same time tighten bolts -1- securing chain sprocket.
- Pull locating pin -T40116- out of balance shaft.



Remaining installation steps are carried out in reverse sequence; note the following:

- Install timing chain cover (bottom) [page 112](#).

Tightening torques

- ◆ ["2.3 Exploded view - drive chain for balance shaft and oil pump", page 122](#)
- ◆ [Fig. "Plug for TDC marking - tightening torque", page 93](#)

3 Cylinder head

- ⇒ “3.1 Exploded view - cylinder head”, page 142
- ⇒ “3.2 Removing and installing cylinder head”, page 145
- ⇒ “3.3 Removing and installing cylinder head cover”, page 151
- ⇒ “3.4 Checking compression”, page 153

3.1 Exploded view - cylinder head



Note

Illustration shows the cylinder head for cylinder bank 2 (left-side).

1 - Cylinder head gasket

- Renewing ⇒ “3.2 Removing and installing cylinder head”, page 145
- Installation position: part number must face cylinder head
- If renewed, change coolant and engine oil
Protective fluid, see “Oil protection”

2 - Cylinder head

- Removing and installing ⇒ page 145 the correct position
- Checking for distortion ⇒ Fig. ““Checking cylinder head for distortion””, page 144
- Machining limit ⇒ Fig. ““Cylinder head machining limit””, page 145
- If renewed, change coolant and engine oil

3 - O-ring

- Renew

4 - Hall sender

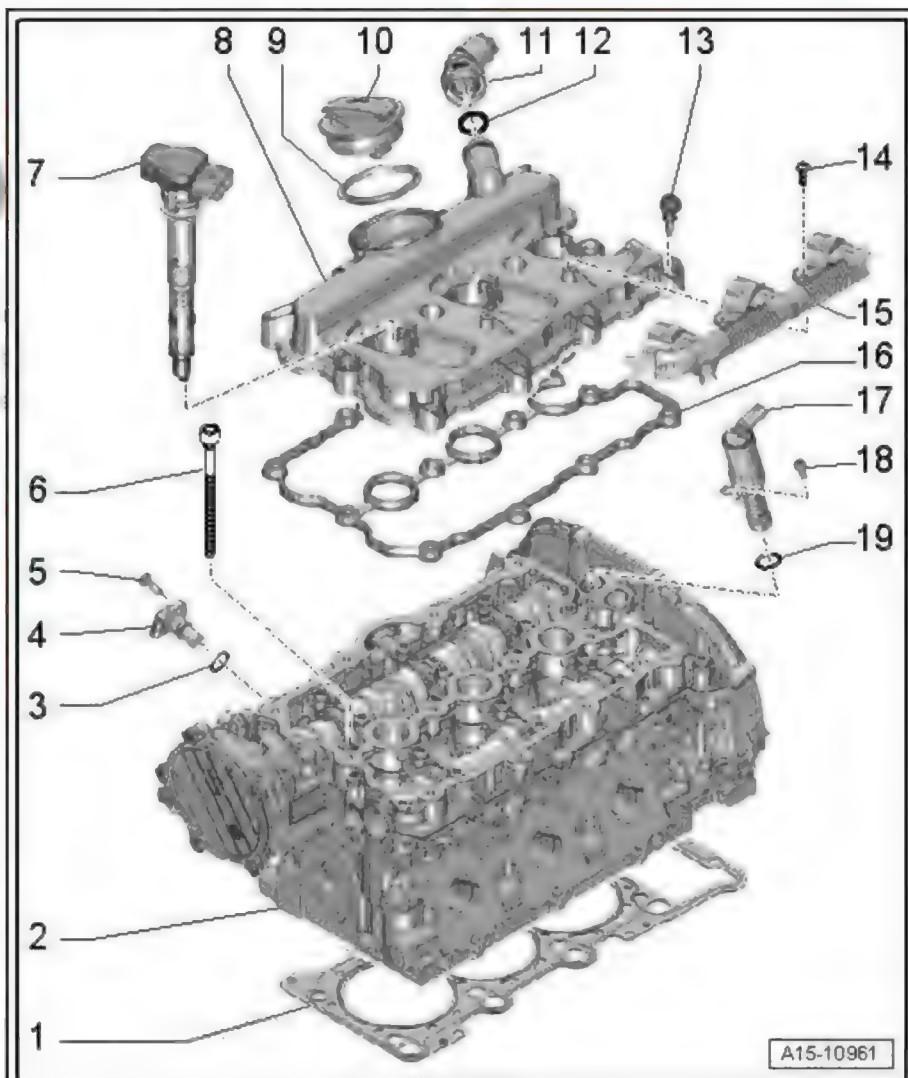
- Cylinder bank 1 (right-side): Hall sender - G40-
- Cylinder bank 2 (left-side): Hall sender 2 - G163-
- Removing and installing ⇒ page 366

5 - Bolt

- Tightening torque ⇒ Item 1 (page 362)

6 - Bolt

- Renew
- Bolts have been gradually converted from Polydrive to multi-point socket
- Note correct sequence when loosening ⇒ page 149



- Tightening torque and sequence ⇒ Fig. “Cylinder head - tightening torque and sequence” , page [144](#)

7 - Ignition coil

- Removing and installing ⇒ “1.3 Removing and installing ignition coils with output stages” , page [363](#)

8 - Cylinder head cover

- Removing and installing: left-side ⇒ [page 152](#) , right-side ⇒ [page 152](#)

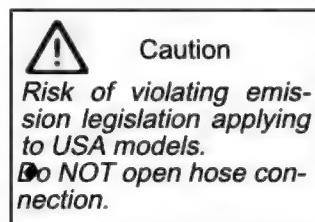
9 - Seal

- Renew if damaged or leaking

10 - Filler cap

11 - Hose

- For crankcase breather
- Removing and installing ⇒ “3.2 Removing and installing crankcase breather hoses” , page [189](#)



12 - O-ring

- Renew

13 - Bolt

- Renew if gasket is damaged
- Tightening torque and tightening sequence: cylinder head cover (left-side) ⇒ [page 144](#) , cylinder head cover (right-side) ⇒ [page 144](#)

14 - Bolt

- Tightening torque ⇒ [Item 8 \(page 362\)](#)

15 - Connector rail

- For ignition coils

16 - Gasket

- For cylinder head cover
- Renew if damaged or leaking

17 - Camshaft control valve

- Cylinder bank 1 (right-side): camshaft control valve 1 - N205-
- Cylinder bank 2 (left-side): camshaft control valve 2 - N208-

18 - Bolt

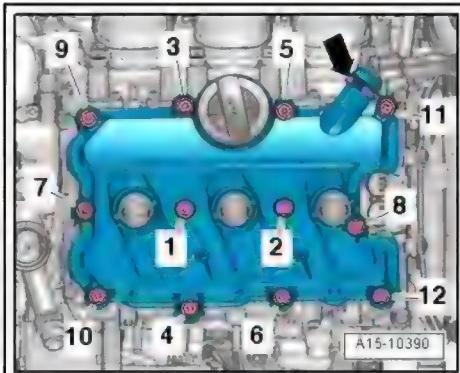
- 5 Nm

19 - O-ring

- Renew

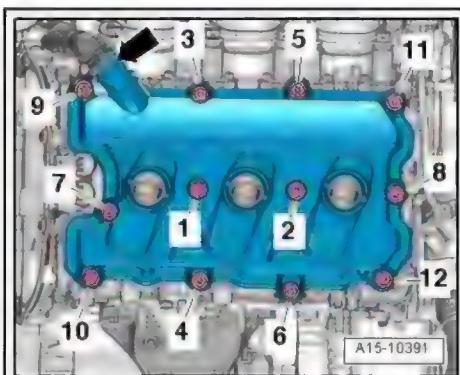
Cylinder head cover (left-side) - tightening torque and sequence

- Tighten bolts in the sequence -1 ... 12- to 9 Nm.



Cylinder head cover (right-side) - tightening torque and sequence

- Tighten bolts in the sequence -1 ... 12- to 9 Nm.



Cylinder head - tightening torque and sequence

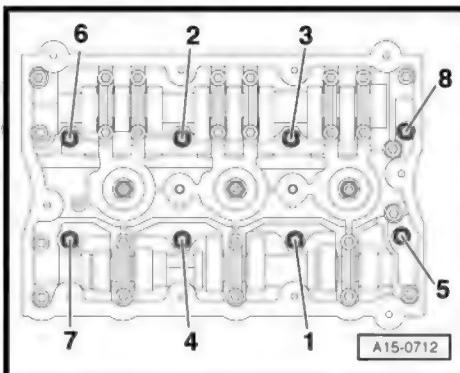


Note

Renew the bolts tightened with specified tightening angle.

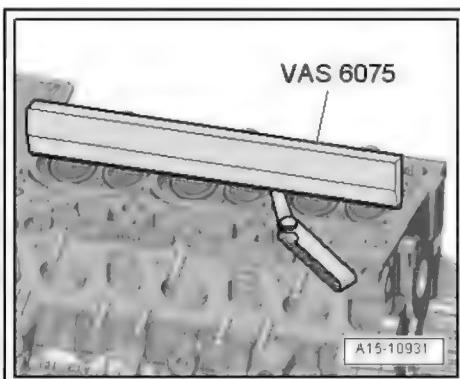
- Tighten bolts in 4 stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 8-	Screw in by hand until contact is made
2.	-1 ... 8-	40 Nm
3.	-1 ... 8-	Turn 90° further
4.	-1 ... 8-	Turn 90° further



Checking cylinder head for distortion

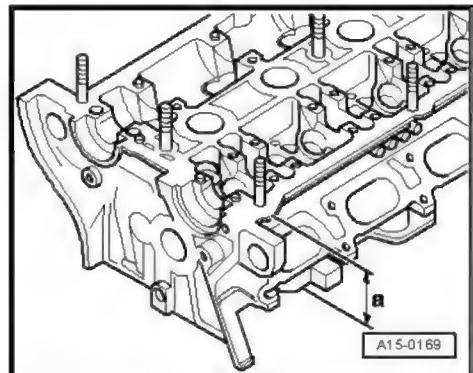
- Use straight edge 500 mm - VAS 6075- and feeler gauge to measure cylinder head for distortion at several points.
- Max. distortion: 0.05 mm.



Cylinder head machining limit

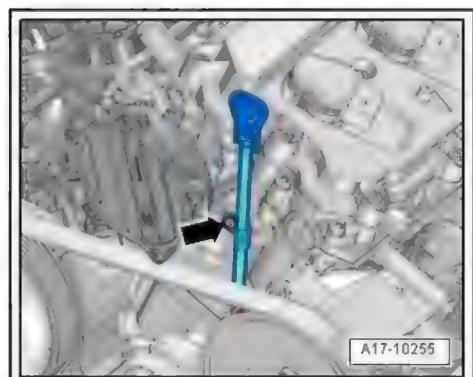
Machining of the cylinder head (surface grinding) is only permissible down to the minimum dimension -a-.

- Minimum dimension: -a- = 139.20 mm



Guide tube for oil dipstick - tightening torque

- Tighten bolt -arrow- to 9 Nm.



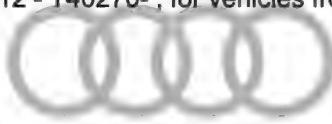
3.2 Removing and installing cylinder head

Special tools and workshop equipment required

- ◆ Special wrench, long reach - T10070- for vehicles up to ► July 2011



- ◆ Bit XZN 12 - T40270-, for vehicles from July 2011 ► onwards



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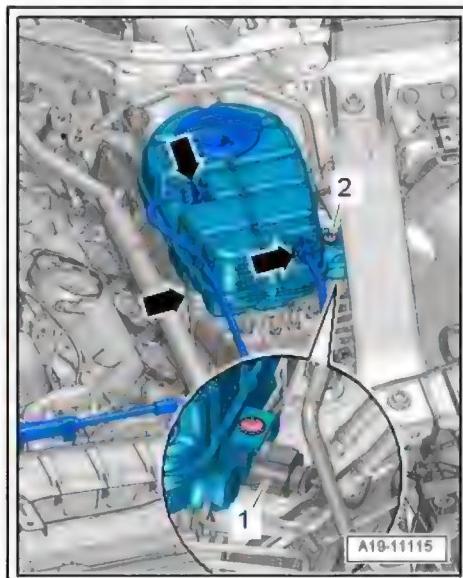


Removing

- Engine in vehicle.

 Note

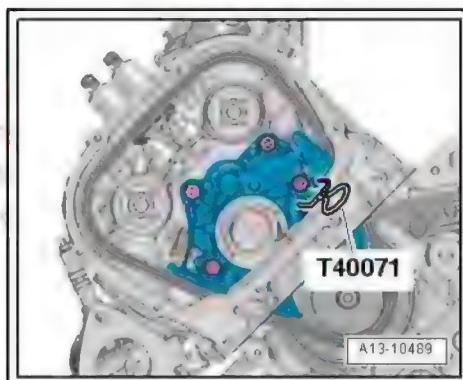
- ◆ The following chapter describes how to remove both cylinder heads together.
 - ◆ If only one of the cylinder heads is to be removed, refer to the corresponding procedure described in this chapter.
 - ◆ Fit all cable ties in the original positions when installing.
- To remove cylinder head (right-side), first remove coolant pipe (top) [⇒ page 232](#).
 - Remove oil filter housing [⇒ page 196](#).
 - Unplug electrical connector -1-.
 - Remove bolt -2-.
 - Lift retaining clips -arrows- and disconnect coolant hoses from coolant expansion tank.
 - Remove intake manifold (bottom sections) [⇒ page 300](#).
 - Unplug electrical connectors at injectors.



- Remove timing chain from camshafts on relevant side [⇒ page 123](#).

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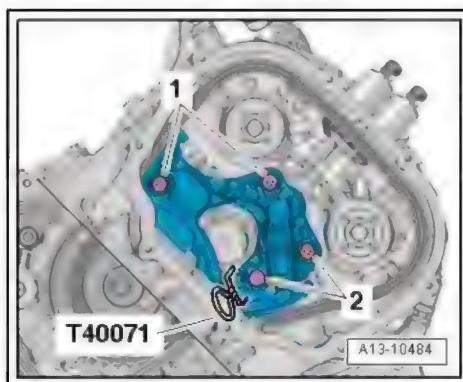
- Remove locking pin - T40071- from cylinder head (left-side).



- Remove bolts -1- and -2- and detach chain tensioner from cylinder head (right-side).

 Note

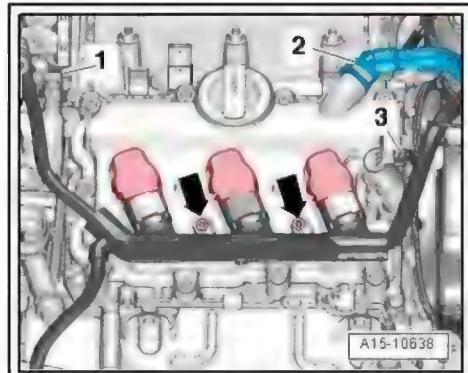
Locking pin - T40071- remains in place.



- Unplug electrical connectors on cylinder head (left-side).
- 1 - For Hall sender 2 - G163-
- 3 - For camshaft control valve 2 - N208-
- Move electrical wiring harness to one side.



-Item 2- and -arrows- can be disregarded.



- Unplug electrical connector -1- for coolant temperature sender - G62- .
- Remove bolts -arrows- at coolant pipe (front).

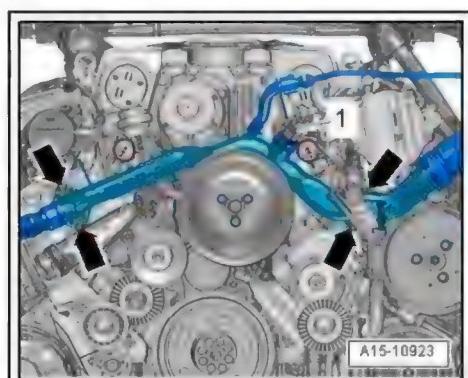


WARNING

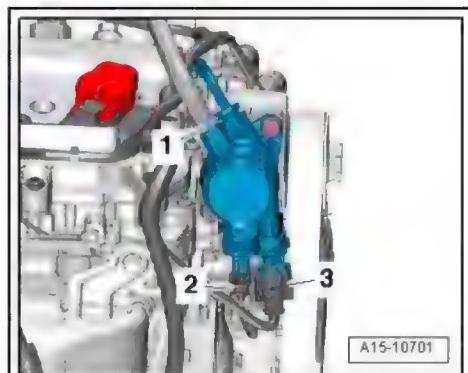
The fuel system is pressurised.

Risk of injury as fuel may spray out.

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap a clean cloth around connection and open connection carefully).



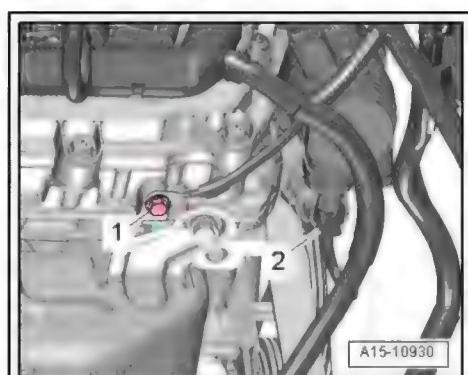
- Unscrew connection -1- and move fuel supply hose clear to one side.
- Unplug electrical connectors -2- and -3-.



- Remove bolt -1- for earth wire.



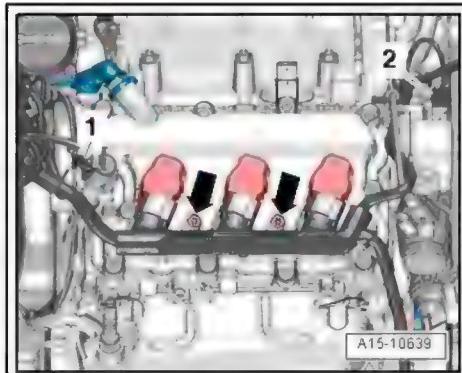
Disregard -item 2-.



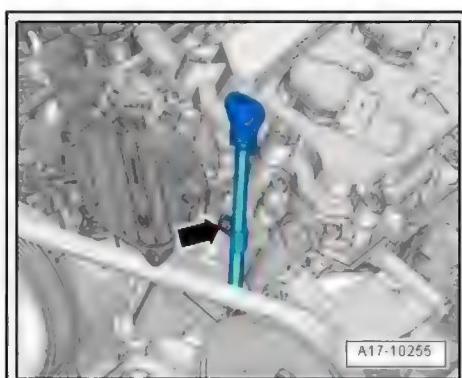
- Unplug electrical connectors on cylinder head (right-side).
- 1 - Camshaft control valve 1 - N205-
- 2 - Hall sender - G40-
- Move electrical wiring harness to one side.



Disregard -arrows-.



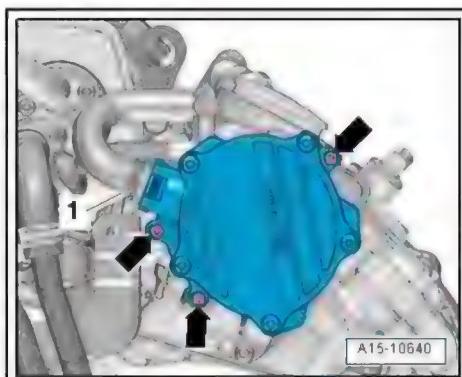
- Remove bolt -arrow- and pull out guide tube for oil dipstick.



- Release hose clip -1-, disconnect vacuum hose from vacuum pump and move vacuum hose clear.

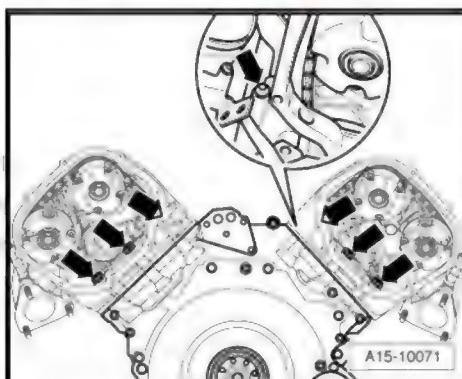


Disregard -arrows-.



- Remove bolts -arrows- at rear of cylinder head.
 - ◆ Cylinder head (left-side): 3 bolts
 - ◆ Cylinder head (right-side): 4 bolts

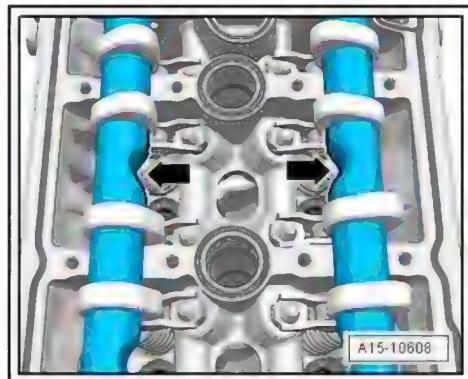
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Note

- ◆ Depending on the version, different camshafts (with or without recesses) and cylinder head bolts (with or without collar) are fitted.
- ◆ Distinguishing features:
- ◆ Cylinder head bolts without a collar have a Polydrive head.
- ◆ Cylinder head bolts with a collar have a multi-point socket head.
- ◆ Camshafts with assembly clearance feature have tool recesses -arrows-; the cylinder head bolts without a collar can be removed without any further preparation. Those with a collar cannot be removed without further preparation (camshafts must be removed [⇒ page 160](#) before cylinder head bolts can be unscrewed).
- ◆ Camshafts without tool recesses must be removed [⇒ page 160](#) before the cylinder head bolts can be removed.



- Slacken cylinder head bolts in the sequence -1 ... 8-.
- Unscrew bolts, detach cylinder head and set it down on a soft surface (foam plastic).

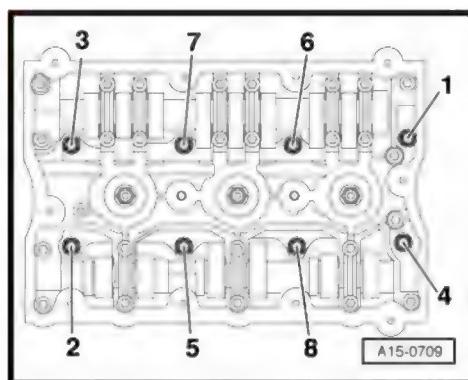
Installing



Caution

Risk of damage to sealing surfaces.

- ◆ Carefully remove sealant residue from cylinder head and cylinder block.
- ◆ Ensure that no long scores or scratches are made on the surfaces.



Risk of damage to cylinder block.

- ◆ No oil or coolant must be allowed to remain in the blind holes for the cylinder head bolts in the cylinder block.

Ensure that cylinder head gasket seals properly:

- ◆ Carefully remove any remaining emery and abrasive material.
- ◆ Do not remove new cylinder head gasket from packaging until it is ready to be fitted.
- ◆ Handle the cylinder head gasket very carefully to prevent damage to the silicone coating or the indented area of the gasket.

Risk of damage to open valves.

- ◆ When installing an exchange cylinder head, the plastic protectors fitted to protect the open valves should not be removed until the cylinder head is ready to be fitted.

Risk of damage to valves and piston crowns after working on valve gear.

- ◆ Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.



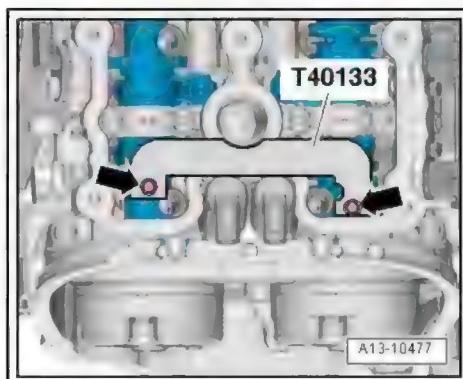
Note



- ◆ Renew the bolts tightened with specified tightening angle.
- ◆ Renew self-locking nuts as well as seals, gaskets and O-rings.
- ◆ Note the different sealants for sealing surfaces and cylinder head bolts.
- ◆ When installing an exchange cylinder head, the contact surfaces between the hydraulic compensation elements, roller rocker fingers and cams must be oiled before installing the cylinder head cover.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- ◆ After renewing the cylinder head or cylinder head gasket, change the coolant and engine oil.

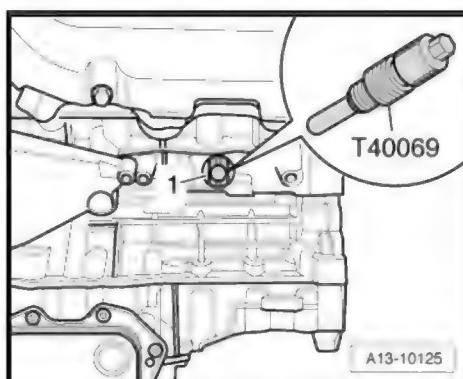
Cylinder head with camshafts installed

- Camshafts on both cylinder heads locked in "TDC" position -arrows- with camshaft clamp - T40133- (25 Nm).
- The camshaft clamp - T40133- is positioned correctly if the holes for the cylinder head bolts remain free.

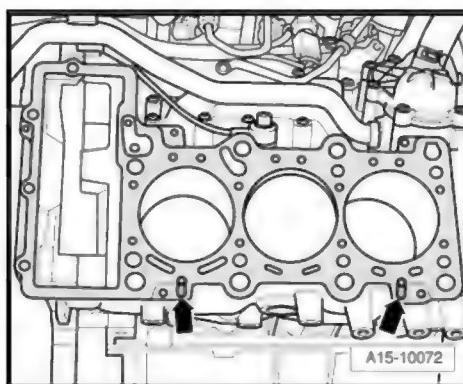


All vehicles (continued)

- Crankshaft -1- locked in "TDC" position with locking pin - T40069- .



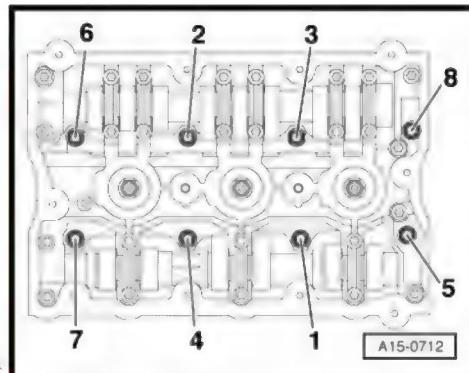
- Renew seals and O-rings for coolant pipe (front).
- Place cylinder head gasket in position.
- Installation position: the word "oben" (top) or the Part No. should be visible.
- Pay attention to dowel sleeves -arrows- in cylinder block.
- Fit cylinder head.



- Tighten cylinder head bolts ⇒ Fig. “Cylinder head - tightening torque and sequence”, page 144 .

Cylinder head with camshafts removed

- Install camshafts ⇒ page 160 .

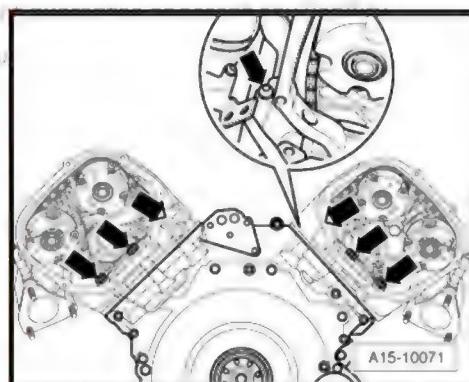


All vehicles (continued)

- Tighten bolts -arrows- for timing chain cover (bottom) ⇒ Fig. “Timing chain cover (bottom) - tightening torque and sequence”, page 108 .
 - ◆ Cylinder head (left-side): 3 bolts
 - ◆ Cylinder head (right-side): 4 bolts



Cylinder head bolts do not have to be torqued down again later after repair work.



Remaining installation steps are carried out in reverse sequence; note the following:

- Install coolant pipe (front) ⇒ page 229 .
- Install camshaft timing chains ⇒ page 135 .
- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install intake manifold (bottom sections) ⇒ page 300 .
- Connect coolant hose with plug-in connector ⇒ Fig. “Connecting coolant hose with plug-in connector”, page 240 .
- Install oil filter housing ⇒ page 196 .
- Install coolant pipe (top) ⇒ page 232 .
- Change engine oil ⇒ Maintenance ; Booklet 411 .
- Fill cooling system with fresh coolant ⇒ page 205 .

Tightening torques

- ◆ ⇒ “3.1 Exploded view - cylinder head”, page 142
- ◆ ⇒ Fig. “Guide tube for oil dipstick - tightening torque”, page 145
- ◆ ⇒ Fig. “Cylinder head - tightening torque and sequence”, page 144
- ◆ ⇒ Fig. “Timing chain cover (bottom) - tightening torque and sequence”, page 108

3.3 Removing and installing cylinder head cover

⇒ “3.3.1 Removing and installing cylinder head cover (left-side)”, page 152

⇒ “3.3.2 Removing and installing cylinder head cover (right-side)”, page 152

3.3.1 Removing and installing cylinder head cover (left-side)

Removing

- Remove ignition coils ⇒ [page 363](#).

Rest-of-world vehicles:

- Disconnect crankcase breather hose -arrow- by pressing release tabs.
- Remove bolts in the sequence -12 ... 1- and remove cylinder head cover (left-side).

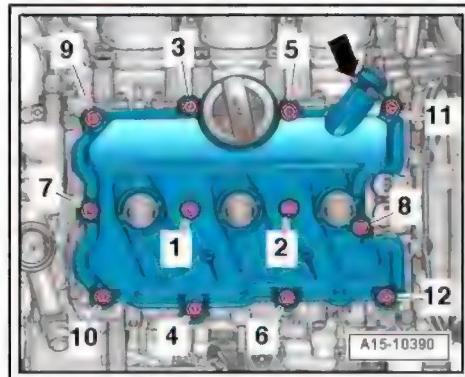
USA models:



Caution

Risk of violating emission legislation applying to USA models.

- ◆ *Do NOT open hose connection -arrow-.*



- Remove bolts in the sequence -12 ... 1- and move cylinder head cover (left-side) clear to one side with crankcase breather hose -arrow- still connected.

Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ *Renew gasket for cylinder head cover if damaged.*
- ◆ *Renew bolts for cylinder head cover if seals on bolts are damaged.*
- ◆ *Fit new O-ring.*

- Clean surfaces; they must be free of oil and grease.
- Tighten bolts for cylinder head cover (left-side) ⇒ [page 144](#).
- Install ignition coils ⇒ [page 363](#).

Tightening torques

- ◆ ⇒ Fig. “Cylinder head cover (left-side) - tightening torque and sequence”, page 144

3.3.2 Removing and installing cylinder head cover (right-side)

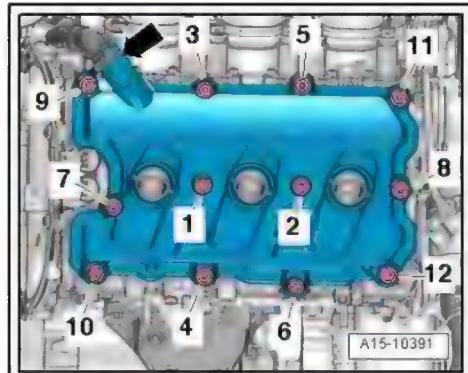
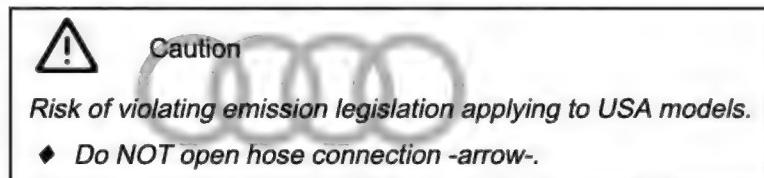
Removing

- Remove ignition coils ⇒ [page 363](#).
- Remove air cleaner housing ⇒ [page 295](#).

Rest-of-world vehicles:

- Disconnect crankcase breather hose -arrow- by pressing release tabs.
- Remove bolts in the sequence -12 ... 1- and remove cylinder head cover (right-side).

USA models:



- Remove bolts in the sequence -12 ... 1- and move cylinder head cover (right-side) clear to one side with crankcase breather hose -arrow- still connected.

Installing

Installation is carried out in reverse order; note the following:



- ◆ *Renew gasket for cylinder head cover if damaged.*
- ◆ *Renew bolts for cylinder head cover if seals on bolts are damaged.*
- ◆ *Fit new O-ring.*
- Clean surfaces; they must be free of oil and grease.
- Tighten bolts for cylinder head cover (right-side) [⇒ page 144](#).
- Install air cleaner housing [⇒ page 295](#).
- Install ignition coils [⇒ page 363](#).

Tightening torques

- ◆ [⇒ Fig. ““Cylinder head cover \(right-side\) - tightening torque and sequence””, page 144](#)

3.4 Checking compression

Special tools and workshop equipment required

- ◆ Spark plug spanner - 3122 B-



- ◆ Compression tester - V.A.G 1763-

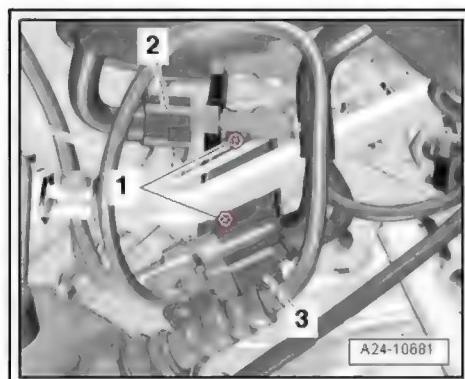


Procedure

- Engine oil temperature at least 30 °C
- Battery voltage at least 12.5 V
- Remove ignition coils [⇒ page 363](#).
- Unplug electrical connector -2- for injectors at rear of cylinder head (left-side).



Disregard items -1 and 3-.

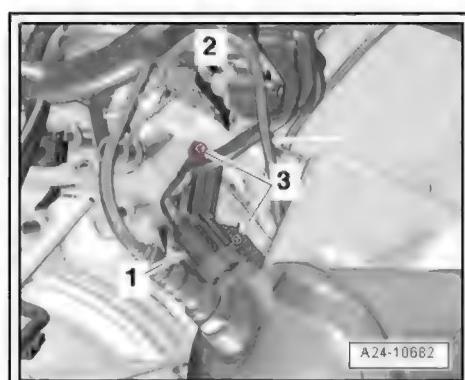


- Unplug electrical connector -2- for injectors at rear of cylinder head (right-side).



Disregard items -1 and 3-.

- Unscrew spark plugs using spark plug socket - 3122 B- .
- Check compression pressure with compression tester - V.A.G 1763- .



Using the compression tester ⇒ Operating instructions .

- Have a 2nd mechanic press down the accelerator pedal completely and at the same time operate the starter until the pressure on the tester display no longer increases.
- Repeat procedure on each cylinder.

Compression pressure	bar
When new	11.0 ... 14.0
Wear limit	10.0
Maximum difference between cylinders	3.0

Assembling

Installation is carried out in the reverse order; note the following:

- Install spark plugs ⇒ Maintenance ; Booklet 411 .
- Install ignition coils ⇒ [page 363](#) .
- Erase any entries in event memory resulting from testing
⇒ Vehicle diagnostic tester, [Guided Functions](#), then [In-terrogate event memory](#).



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4 Valve gear

- ⇒ [“4.1 Exploded view - valve gear”, page 156](#)
- ⇒ [“4.2 Measuring axial clearance of camshaft”, page 159](#)
- ⇒ [“4.3 Measuring radial clearance of camshaft”, page 160](#)
- ⇒ [“4.4 Removing and installing camshaft”, page 160](#)
- ⇒ [“4.5 Checking hydraulic compensation elements”, page 166](#)
- ⇒ [“4.6 Removing and installing valve stem oil seals”, page 168](#)

4.1 Exploded view - valve gear



Note

- ◆ Cylinder heads which have cracks between the valve seats or between a valve seat insert and the spark plug thread can be re-installed without reducing service life, provided the cracks are only slight and do not exceed a maximum of 0.3 mm in width, and no more than the first 4 turns of the spark plug threads are cracked.
- ◆ Illustration shows the cylinder head for cylinder bank 2 (left-side).



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1 - Sealing plug

- Apply sealant when installing; refer to ⇒ Electronic parts catalogue

2 - Cylinder head

- Checking valve guides
⇒ "5.1 Checking valve guides", page 175

3 - Valve stem oil seal

- Renewing with cylinder head installed ⇒ "4.6.1 Removing and installing valve stem oil seals (cylinder head installed)", page 168
- Renewing with cylinder head removed ⇒ "4.6.2 Removing and installing valve stem oil seals (cylinder head removed)", page 171

4 - Valve spring

- Installation position ⇒ Fig. "Installation position of valve spring", page 158

5 - Hydraulic compensation element

- Clipped into roller rocker finger -item 8-
- Checking ⇒ "4.5 Checking hydraulic compensation elements", page 166 permitted until
- Mark installation position for re-installation
- Lubricate contact surface before installing

6 - Valve spring plate

7 - Valve cotters

8 - Roller rocker finger

- Mark installation position for re-installation
- Check roller bearings for ease of movement
- Lubricate contact surface before installing
- Assembly: attach to hydraulic compensation element -item 5- using securing clip -item 9-

9 - Securing clip

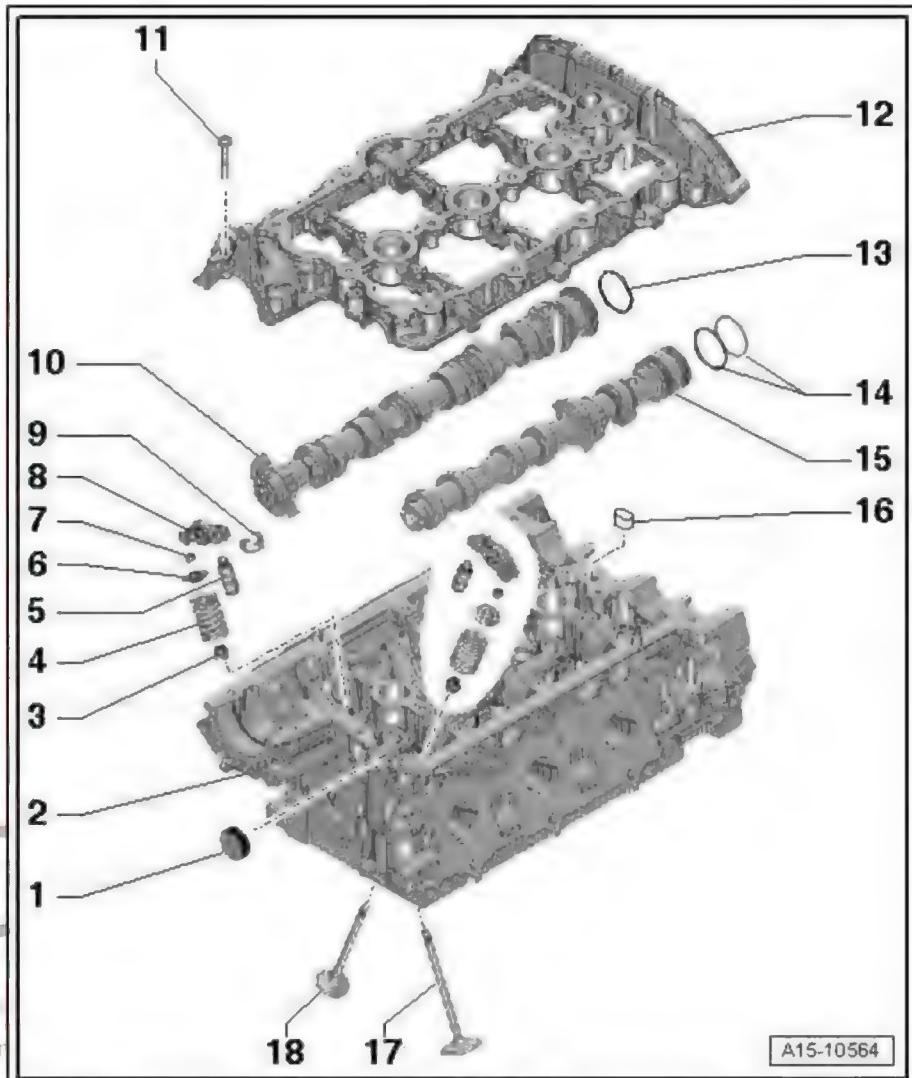
- Not supplied separately
- Check for firm attachment

10 - Inlet camshaft

- Removing and installing ⇒ "4.4 Removing and installing camshaft", page 160
- Measuring axial clearance ⇒ "4.2 Measuring axial clearance of camshaft", page 159
- Measuring radial clearance ⇒ "4.3 Measuring radial clearance of camshaft", page 160
- Runout: max. 0.04 mm

11 - Bolt

- Renew



A15-10564

- Tightening torque and sequence ⇒ Fig. ““Retaining frame for camshafts - tightening torque and sequence””, page 159

12 - Retaining frame

- With integrated camshaft bearings
- Removing and installing ⇒ “4.4 Removing and installing camshaft”, page 160

13 - Compression ring

14 - Rectangular section seals

- One or two fitted depending on version; for allocation, refer to ⇒ Electronic parts catalogue

15 - Exhaust camshaft

- Removing and installing ⇒ “4.4 Removing and installing camshaft”, page 160
- Measuring axial clearance ⇒ “4.2 Measuring axial clearance of camshaft”, page 159
- Measuring radial clearance ⇒ “4.3 Measuring radial clearance of camshaft”, page 160
- Runout: max. 0.04 mm

16 - Oil strainer

- Not fitted on all versions; for allocation, refer to ⇒ Electronic parts catalogue

17 - Inlet valve

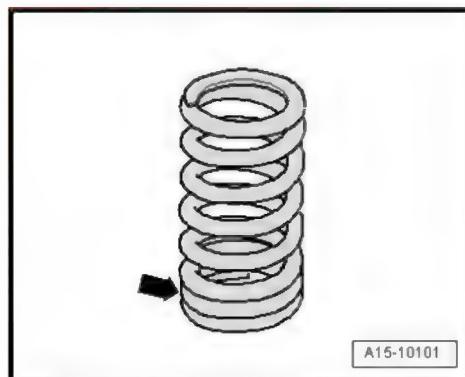
- Must not be machined; only grinding-in is permissible
- Mark installation position for re-installation
- Checking ⇒ “5.2 Checking valves”, page 176
- Valve dimensions ⇒ “5.3 Valve dimensions”, page 176
- Checking valve guides ⇒ “5.1 Checking valve guides”, page 175

18 - Exhaust valve

- Must not be machined; only grinding-in is permissible
- Mark installation position for re-installation
- Checking ⇒ “5.2 Checking valves”, page 176
- Valve dimensions ⇒ “5.3 Valve dimensions”, page 176
- Checking valve guides ⇒ “5.1 Checking valve guides”, page 175

Installation position of valve spring

- Closely spaced spring coils -arrow- face towards cylinder head.



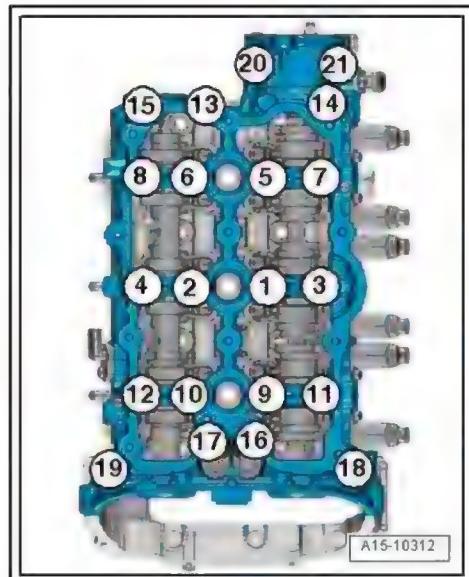
Retaining frame for camshafts - tightening torque and sequence



Note

- ◆ The illustration shows the retaining frame for the camshafts of the left-hand cylinder head. The procedure is symmetrically opposite on the right-hand cylinder head.
- ◆ Renew the bolts tightened with specified tightening angle.
- Tighten bolts in 3 stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 21-	Screw in by hand until contact is made <ul style="list-style-type: none"> • The retaining frame should make contact with the cylinder head over the full surface
2.	-1 ... 21-	8 Nm
3.	-1 ... 21-	Turn 90° further



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4.2 Measuring axial clearance of camshaft

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-



W00-11125

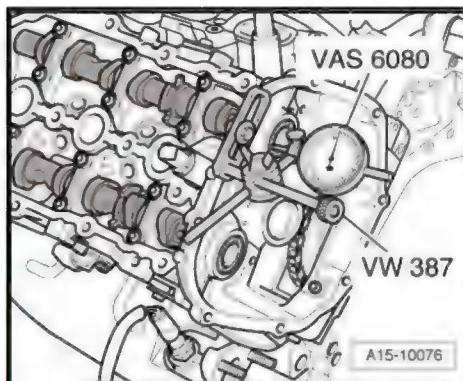
- ◆ Dial gauge - VAS 6079-



W00-11309

Procedure

- Remove camshafts [⇒ page 160](#).
- Mark allocation of roller rocker fingers for re-installation.
- Carefully remove roller rocker fingers and place them on a clean surface.
- Re-insert camshafts, install retaining frame [⇒ Fig. “Retaining frame for camshafts - tightening torque and sequence”](#), [page 159](#) and tighten with old bolts to 8 Nm.
- Secure universal dial gauge bracket - VW 387- with dial gauge - VAS 6079- to cylinder head as shown in illustration.
- Press camshaft against dial gauge by hand.
- Set dial gauge to "0".
- Press camshaft away from dial gauge and read off value:
Axial clearance: 0.100 ... 0.191 mm



4.3 Measuring radial clearance of camshaft

Special tools and workshop equipment required

- ◆ Plastigauge

Procedure

- Remove camshafts [⇒ page 160](#).
- Mark allocation of roller rocker fingers for re-installation.
- Carefully remove roller rocker fingers and place them on a clean surface.
- Clean bearings and bearing journals.
- Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or bearing shell to be measured.
- The Plastigauge must be positioned in the centre of the bearing.
- Re-insert camshafts, fit retaining frame, secure with old bolts and tighten to final torque without rotating camshafts [⇒ page 159](#).
- Remove retaining frame and camshafts again.
- Compare width of Plastigauge with measurement scale.

Radial clearance:

- 24 mm bearing Ø: 0.024 ... 0.066 mm
- 36 mm bearing Ø: 0.032 ... 0.078 mm

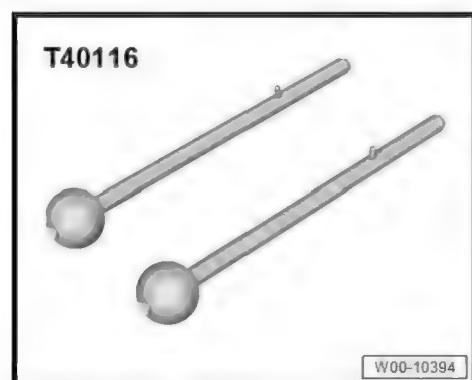
4.4 Removing and installing camshaft

Special tools and workshop equipment required

- ◆ Impact extractor attachment -T10133/3- from tool set for FSI engines - T10133 C-



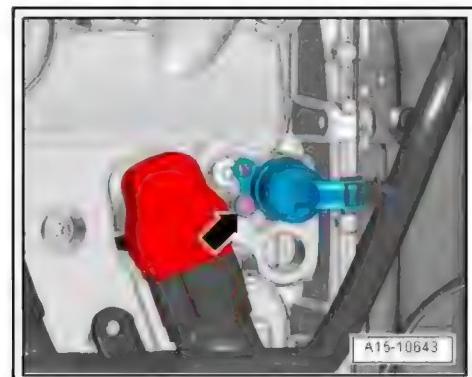
- ◆ Locating pins - T40116-



- ◆ Electric drill with plastic brush
- ◆ Safety goggles
- ◆ Sealant ⇒ Electronic parts catalogue

Removing

- Remove timing chains from camshafts [⇒ page 123](#).
- To remove camshafts in cylinder head (left-side), remove vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .
- To remove camshafts in cylinder head (right-side), first remove high-pressure pump and housing for high-pressure pump drive [⇒ page 313](#).
- Remove bolt -arrow- and detach camshaft control valve.

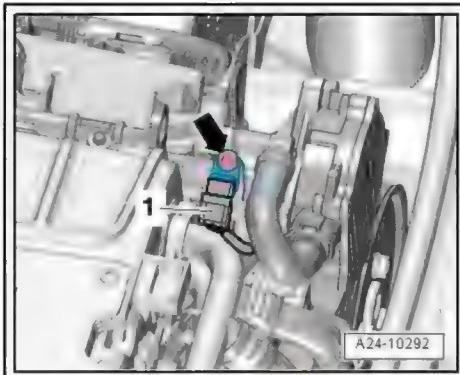


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- Unplug electrical connector -1- at Hall sender.



Disregard -arrow-.

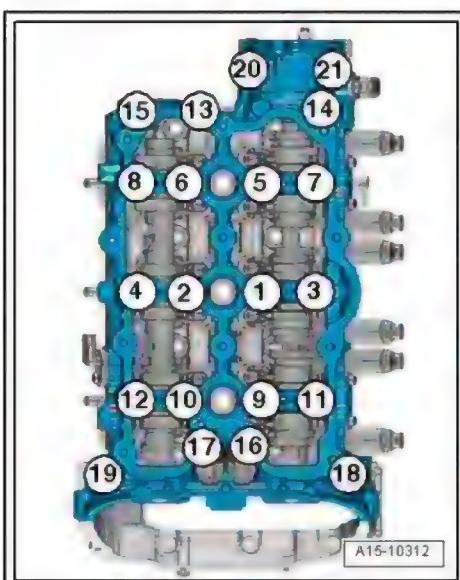


- Slacken retaining frame bolts in the sequence -21 ... 1-.

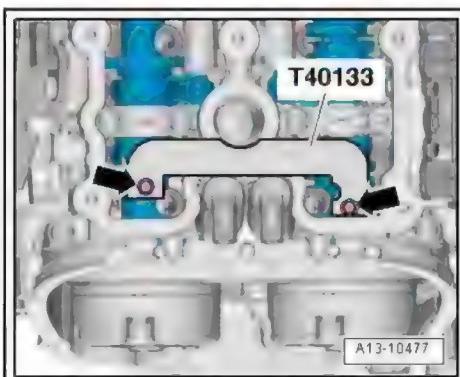


Perform the same procedure (laterally reversed) on retaining frame (right-side).

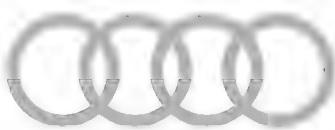
- Remove bolts, carefully release retaining frame from bonded joint and set it down on a soft surface on workbench.



- Remove camshaft clamp - T40133- -arrows-.
- Mark and remove camshafts.

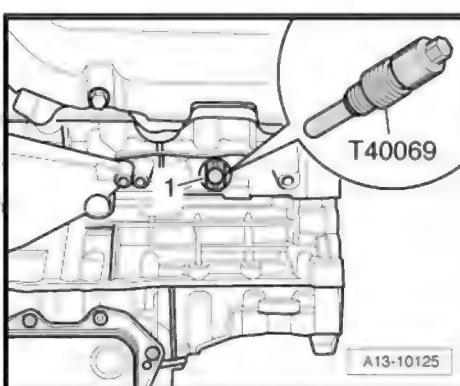


Installing



Renew seals/gaskets and sealing plugs.

- Crankshaft -1- locked in "TDC" position with locking pin - T40069- .
- Hydraulic compensation elements and roller rocker fingers installed.



Caution

Protect lubrication system and bearings against contamination.

- ◆ Cover exposed parts of the engine.



WARNING

Risk of eye injury due to sealant residue.

- Put on safety goggles.

- Remove remaining sealant from cylinder head and retaining frame -1- using rotating plastic brush or similar.
- Clean surfaces; they must be free of oil and grease.
- Check strainer -arrow- for dirt and clean as necessary.



Note

*Strainer -arrow- is not fitted on all versions; for allocation refer to
 ⇒ Electronic parts catalogue .*

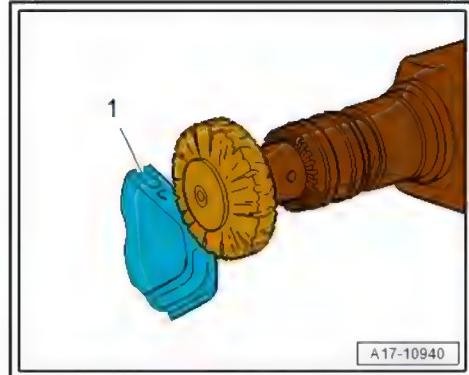
- Oil running surfaces of both camshafts.
- Fit camshafts in retaining frame.
- Camshafts must be in correct position in axial bearings -arrows- in retaining frame.
- The ends of the rectangular section seals -1, 2, 3- must point up or down. The ends of the rectangular section seals must never point to the side.



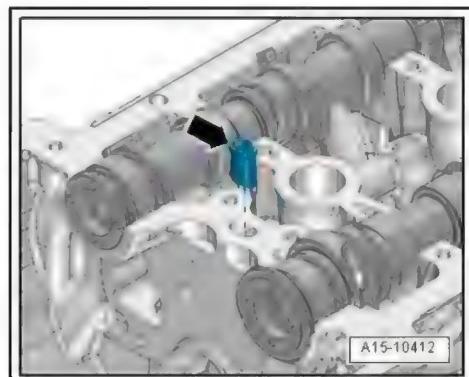
Note

One or two rectangular section seals are installed on the exhaust camshaft -2 and/or 3- (depending on version). For allocation, refer to ⇒ Electronic parts catalogue .

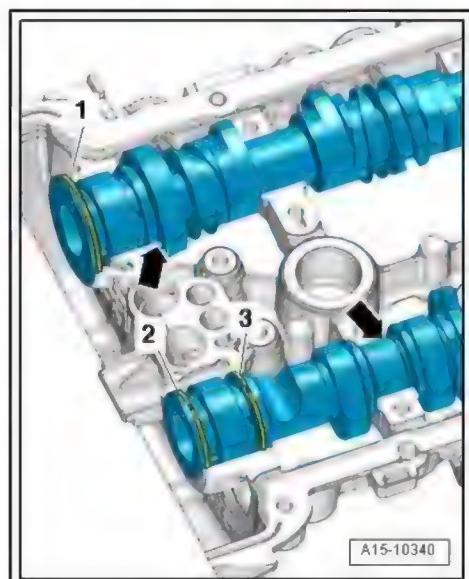
- Turn retaining frame over with camshafts fitted, holding camshafts firmly in position.



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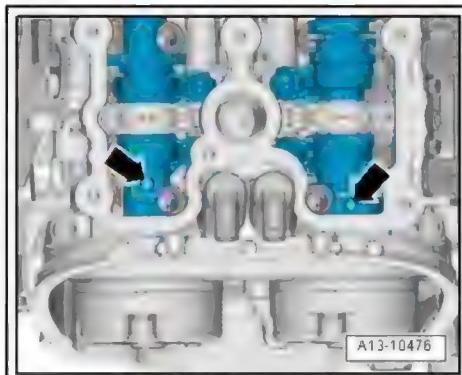
A15-10412



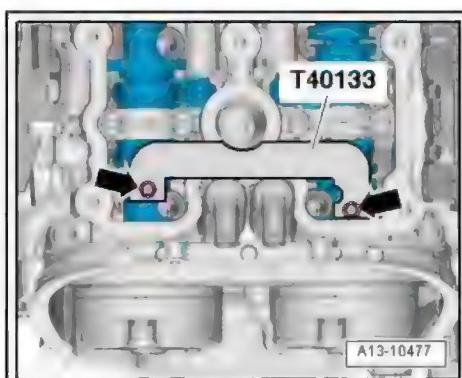
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- Turn camshafts until threaded holes -arrows- point upwards.
- Check that camshafts are still in correct position in axial bearings in retaining frame.



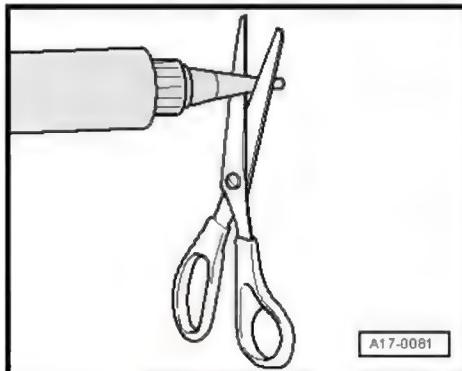
- Fit camshaft clamps - T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm.



Note

Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle Ø approx. 2 mm).



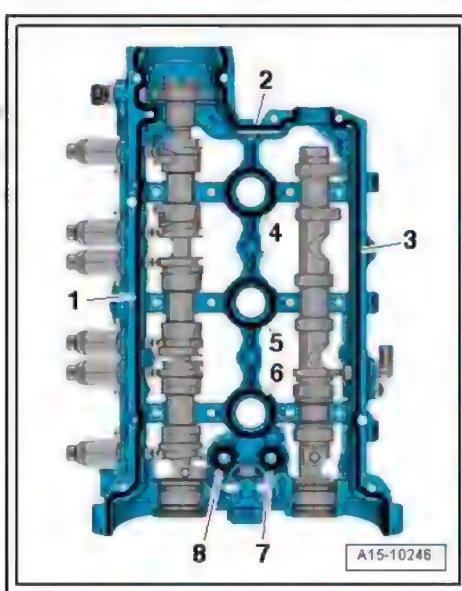
- Turn retaining frame upside down again.

Caution

Make sure lubrication system is not clogged by excess sealant.

◆ The sealant beads must not be thicker than specified.

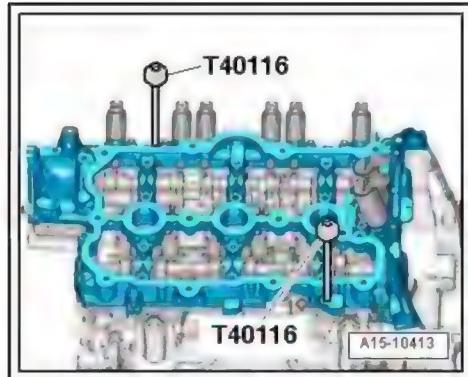
- Apply beads of sealant -4 ... 8- onto clean sealing surfaces of retaining frame as shown in illustration.
- Width of sealant beads: 2.0 mm.
- Apply beads of sealant -1 ... 3- onto clean sealing surfaces of retaining frame as shown in illustration.
- Width of sealant beads: 2.5 mm.



Note

The retaining frame must be installed within 5 minutes after applying the sealant.

- Fit retaining frame onto cylinder head.
- Insert locating pins -T40116- in retaining frame and cylinder head.

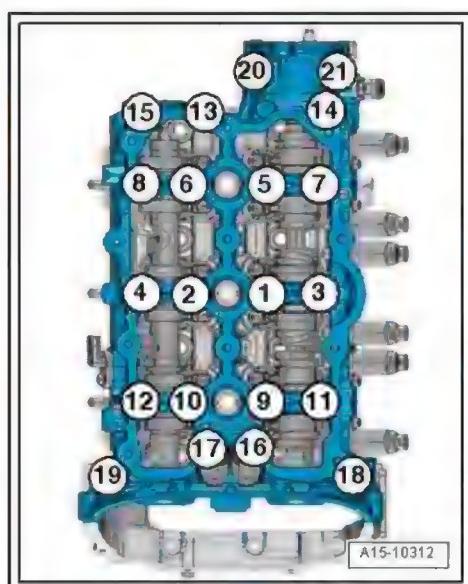


- Tighten bolts securing retaining frame for camshafts ⇒ [page 159](#).

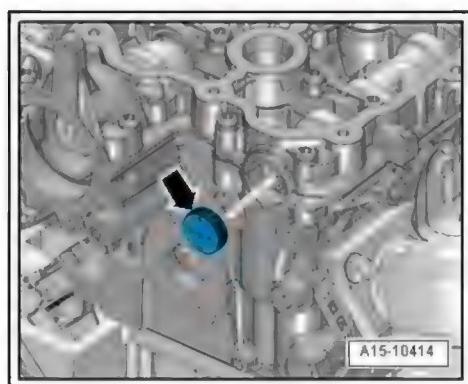


Note

After installing the retaining frame, wait about 30 minutes for the sealant to dry.



- Clean bore for outer sealing plug in cylinder head (left and right); it must be free of oil and grease.
- Coat outer circumference of sealing plug -arrow- with sealant; for sealant refer to ⇒ Electronic parts catalogue .
- Drive in sealing plug until flush.



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- Use impact extractor attachment -T40116- to pull out locating pins -T10133/3- .

Remaining installation steps are carried out in reverse sequence; note the following:

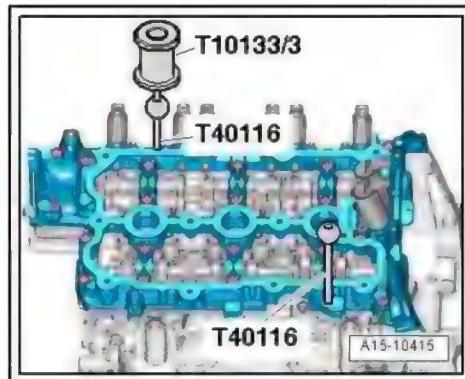
- Install housing for high-pressure pump drive and high-pressure pump [⇒ page 313](#) .
- Fit timing chains on camshafts [⇒ page 123](#) .



Caution

Risk of damage to valves and piston crowns after working on valve gear.

- ◆ *The hydraulic tappets have to settle; wait for approx. 30 minutes after installing camshafts before starting engine.*
- ◆ *Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.*



Tightening torques

- ◆ [⇒ "3.1 Exploded view - cylinder head", page 142](#)
- ◆ [⇒ Fig. "Retaining frame for camshafts - tightening torque and sequence" , page 159](#)
- ◆ [⇒ Brake system; Rep. gr. 47 ; Vacuum system; Exploded view - vacuum pump](#)

4.5 Checking hydraulic compensation elements



Note

- ◆ *The hydraulic compensation elements cannot be serviced.*
- ◆ *Irregular valve noises when starting engine are normal.*

Special tools and workshop equipment required

- ◆ Feeler gauge



- ◆ Adapter - T40058- for vehicles with 7-speed dual clutch gearbox 0B5

Procedure

- Start engine and run until radiator fan has started up once.

- Increase engine speed to approx. 2500 rpm for 2 minutes (perform road test if necessary).
- If the compensation elements are still noisy, locate the defective compensation element as follows:

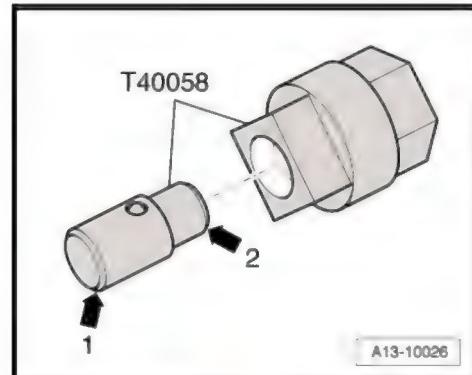


WARNING

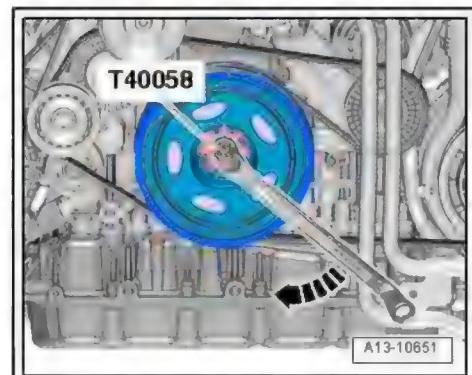
Risk of injury as the radiator fans may start up automatically.

- ◆ Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.

- Remove cylinder head cover: left-side ⇒ [page 152](#); right-side ⇒ [page 152](#).
- Turn crankshaft until cam of hydraulic compensation element to be tested is at top:
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Insert guide pin of adapter -T40058- as follows:
 - The larger-diameter section -arrow 1- faces towards the engine.
 - The smaller-diameter section -arrow 2- faces the adapter.



- Use adapter - T40058- and angled ring spanner to turn crankshaft in direction of engine rotation -arrow-.

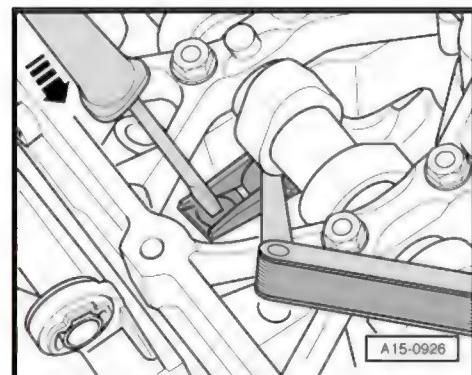


- Press roller rocker finger down -arrow- to determine clearance between cam and roller rocker finger.
- If it is possible to insert a feeler gauge of 0.20 mm between cam and roller rocker finger, renew hydraulic compensation element ⇒ "4.4 Removing and installing camshaft", page [160](#) .

Additional steps required

- Install cylinder head cover: left-side ⇒ [page 152](#); right-side ⇒ [page 152](#).

Tightening torques



- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

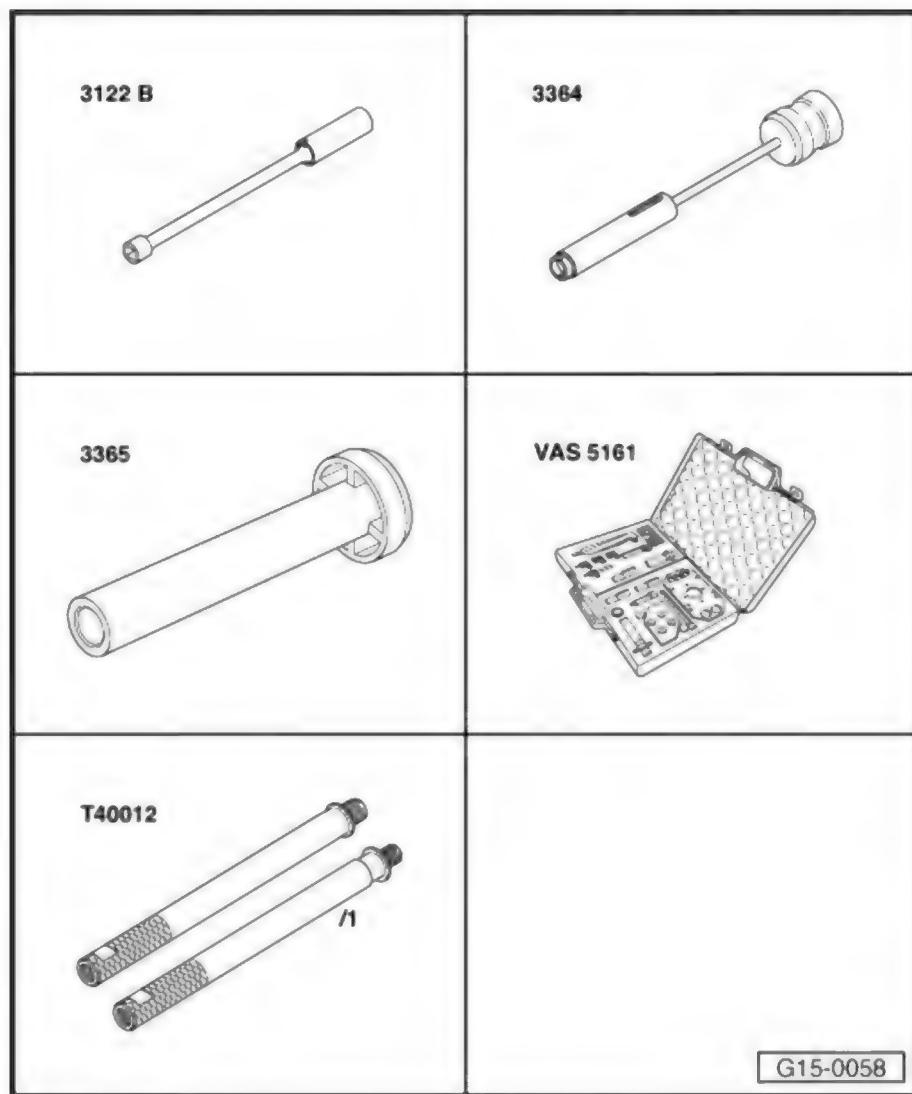
4.6 Removing and installing valve stem oil seals

⇒ "4.6.1 Removing and installing valve stem oil seals (cylinder head installed)", page 168

⇒ "4.6.2 Removing and installing valve stem oil seals (cylinder head removed)", page 171

4.6.1 Removing and installing valve stem oil seals (cylinder head installed)

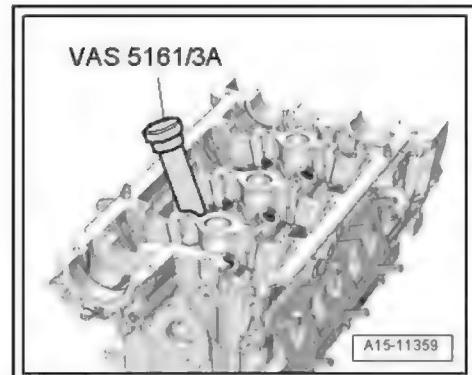
Special tools and workshop equipment required



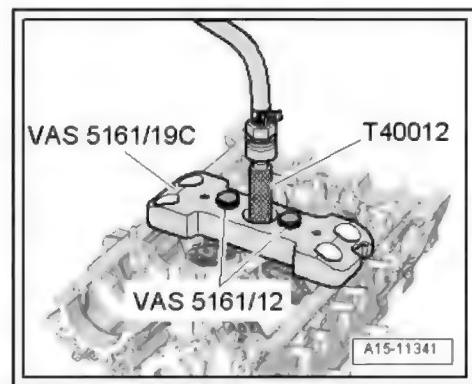
- ◆ Spark plug spanner - 3122 B-
- ◆ Valve stem seal puller - 3364-
- ◆ Valve stem seal fitting tool - 3365-
- ◆ Removal and installation device for valve cotters - VAS 5161
A- with guide plate -VAS 5161/19C-, or substitute -VAS 5161/19B-
- ◆ Adapters - T40012-

Procedure

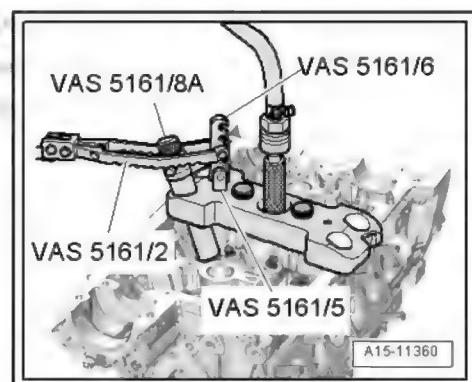
- Remove camshafts [⇒ page 160](#).
- Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.
- Unscrew spark plugs using spark plug socket - 3122 B- .
- Set piston of appropriate cylinder to "bottom dead centre".
- Apply drift -VAS 5161/3A- to valve spring plate and use plastic-headed hammer to release sticking valve coppers.



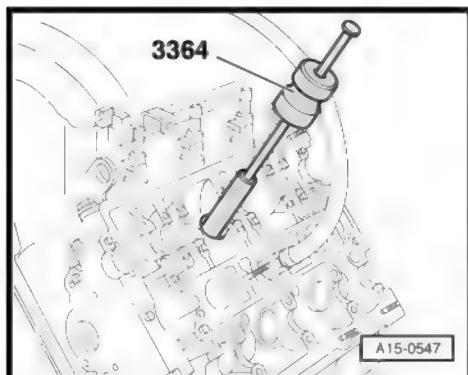
- Fit guide plate -VAS 5161/19C- onto cylinder head.
- Secure guide plate with knurled screws -VAS 5161/12- .
- Screw adapter - T40012- with seal hand-tight into the corresponding spark plug thread.
- Connect adapter to compressed air line using a commercially available connection piece and apply constant air pressure.
- Minimum pressure: 6 bar



- Screw snap-in device -VAS 5161/6- with engaging fork VAS 5161/5- into guide plate.
- Insert assembly cartridge -VAS 5161/8A- in guide plate.
- Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
- At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve coppers.
- Move knurled screw back and forth slightly; the valve coppers are thus forced apart and taken up by the assembly cartridge.
- Release pressure fork.
- Take out assembly cartridge.
- Detach guide plate and turn to one side.
- The compressed air hose remains connected.
- Detach valve spring with valve spring plate.

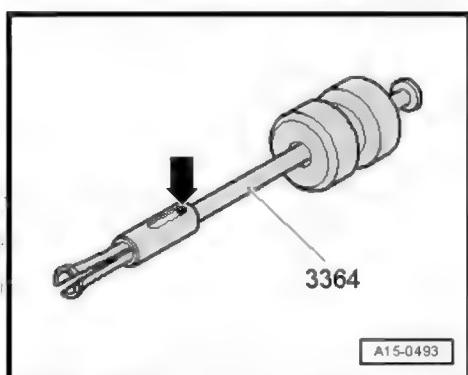


- Pull off valve stem oil seal with valve stem seal puller - 3364- .

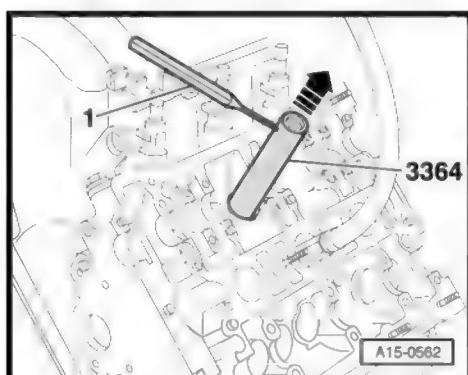


If the puller -3364- cannot be used on some of the valve stem oil seals due to the confined space, proceed as follows:

- Knock out pin -arrow- of puller using a drift and remove impact extractor attachment.



- Apply bottom section of puller -3364- to valve stem oil seal.
- Secure puller with a punch or roll-pin drift -1-, as shown in illustration.
- Apply assembly lever to puller and pull out valve stem oil seal -arrow-.

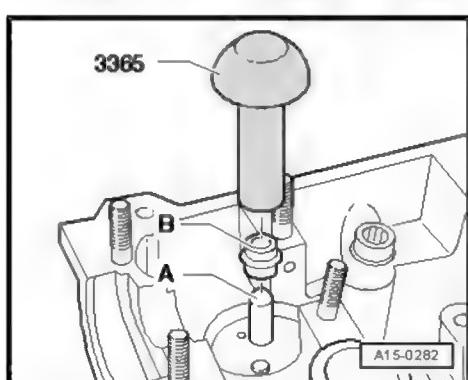


Caution

Make sure valve stem oil seals are not damaged when installing.

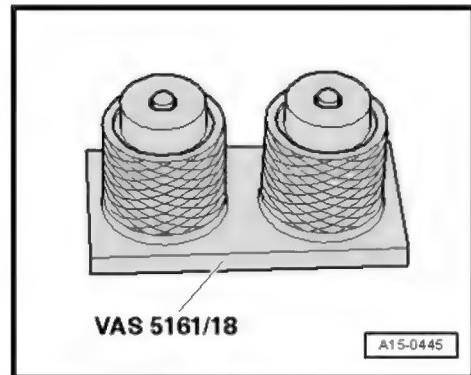
- ◆ New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.

- Lightly oil sealing lip of valve stem oil seal.
- Slide valve stem oil seal onto plastic sleeve.
- Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .
- Take off plastic sleeve.



If valve coppers had been removed from assembly cartridge they must first be inserted in insertion device -VAS 5161/18- .

- Larger diameter of valve coppers faces upwards.
- Press assembly cartridge onto insertion device from above and pick up valve coppers.
- Insert valve spring and valve spring plate.
- Installation position of valve spring [⇒ page 158](#) .



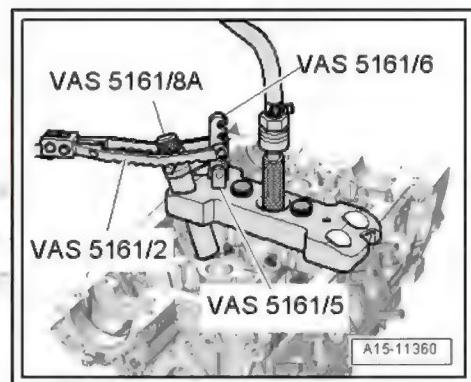
Secure guide plate back onto cylinder head.

- Insert assembly cartridge in guide plate.
- Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve coppers.
- Release pressure fork with knurled screw still in pulled position.
- With Repeat procedure for each valve.

Assembling

Installation is carried out in the reverse order; note the following:

- Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.
- Install spark plugs ⇒ Maintenance ; Booklet 411 .
- Install camshafts [⇒ page 160](#) .



Caution

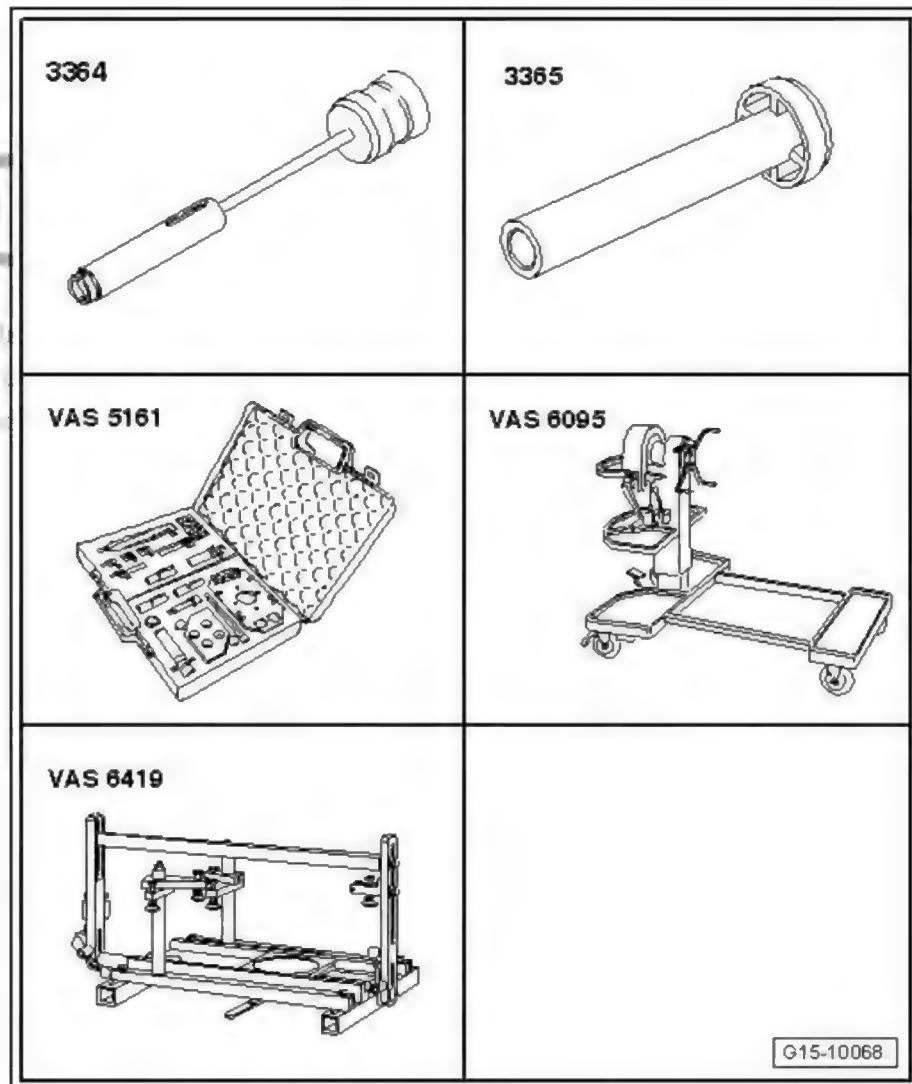
Risk of damage to valves and piston crowns after working on valve gear.

- ◆ *The hydraulic tappets have to settle; wait for approx. 30 minutes after installing camshafts before starting engine.*
- ◆ *Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.*

4.6.2 Removing and installing valve stem oil seals (cylinder head removed)

Special tools and workshop equipment required

provided
permitted
intended

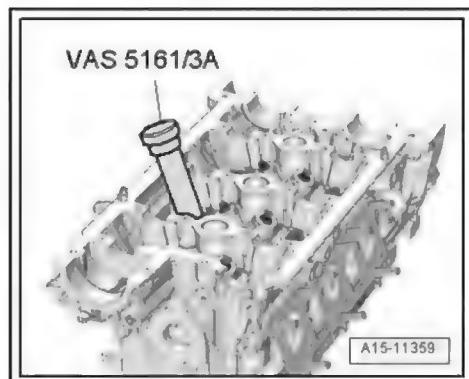
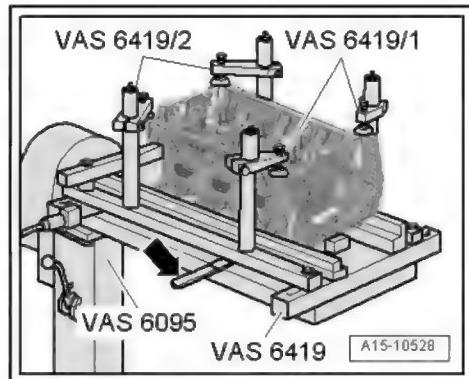


- ◆ Valve stem seal puller - 3364-
- ◆ Valve stem seal fitting tool - 3365-
- ◆ Removal and installation device for valve cotters - VAS 5161
A- with guide plate -VAS 5161/19C-, or substitute -VAS 5161/19B-
- ◆ Engine and gearbox support - VAS 6095-
- ◆ Cylinder head tensioning device - VAS 6419-

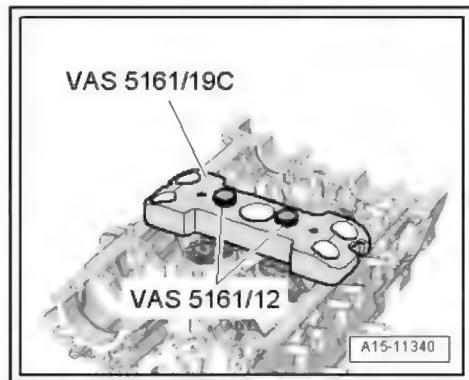
Procedure

- Remove camshafts [page 160](#).
- Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.

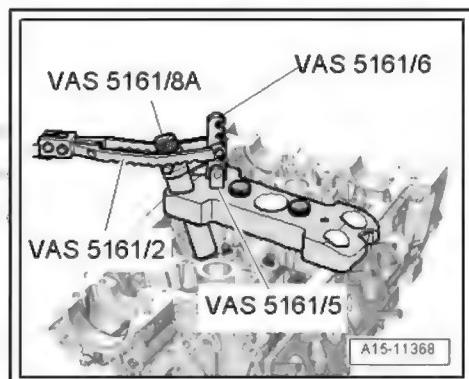
- Insert cylinder head tensioning device - VAS 6419- into engine and gearbox support - VAS 6095- .
- Secure cylinder head in cylinder head tensioning device, as shown in illustration.
- Connect cylinder head tensioning device to compressed air supply.
- Using lever -arrow-, slide air pad under combustion chamber where valve stem oil seal is to be removed.
- Apply just enough compressed air to bring air pad into contact with valve heads.
- Apply drift -VAS 5161/3A- to valve spring plate and use plastic-headed hammer to release sticking valve coppers.



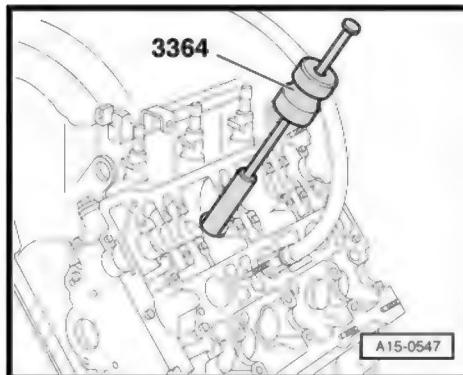
- Fit guide plate -VAS 5161/19C- onto cylinder head.
- Secure guide plate with knurled screws -VAS 5161/12- .



- Screw snap-in device -VAS 5161/6- with engaging fork - VAS 5161/5- into guide plate.
- Insert assembly cartridge -VAS 5161/8A- in guide plate.
- Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
- At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve coppers.
- Move knurled screw back and forth slightly; the valve coppers are thus forced apart and taken up by the assembly cartridge.
- Release pressure fork.
- Take out assembly cartridge.
- Detach guide plate and turn to one side.
- Detach valve spring with valve spring plate.



- Pull off valve stem oil seal with valve stem seal puller - 3364- .

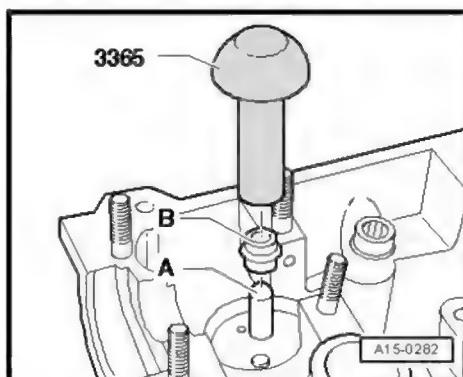


Caution

Make sure valve stem oil seals are not damaged when installing.

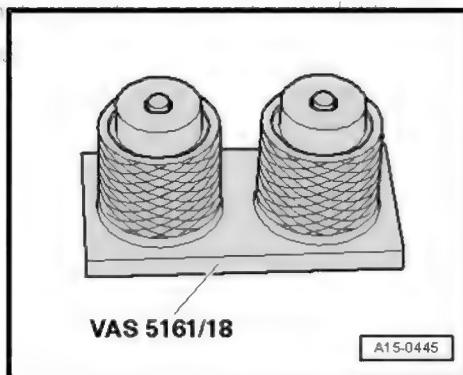
- ◆ New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.

- Lightly oil sealing lip of valve stem oil seal.
- Slide valve stem oil seal onto plastic sleeve.
- Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .
- Take off plastic sleeve.



If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161/18- .

- Larger diameter of valve cotters faces upwards.
- Press assembly cartridge onto insertion device from above and pick up valve cotters.
- Insert valve spring and valve spring plate.
- Installation position of valve spring [⇒ page 158](#) .

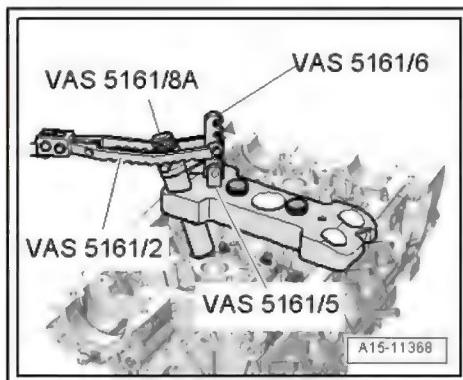


- Secure guide plate back onto cylinder head.
- Insert assembly cartridge in guide plate.
- Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve cotters.
- Release pressure fork with knurled screw still in pulled position.
- Repeat procedure for each valve.

Assembling

Installation is carried out in the reverse order; note the following:

- Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.
- Install camshafts [⇒ page 160](#) .



5 Inlet and exhaust valves

⇒ "5.1 Checking valve guides", page 175

⇒ "5.2 Checking valves", page 176

⇒ "5.3 Valve dimensions", page 176

5.1 Checking valve guides

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-



- ◆ Dial gauge - VAS 6079-



Procedure



Note

- ◆ If the valve has to be renewed as part of a repair, use a new valve for the measurement.
- ◆ Only insert inlet valve into inlet valve guide and exhaust valve into exhaust valve guide, as the stem diameters are different.

- Secure dial gauge - VAS 6079- to cylinder head with universal dial gauge bracket - VW 387- as shown in illustration.
- Insert valve into guide.
- End of valve stem must be flush with valve guide.
- Measure the amount of sideways play.
- Wear limit: 0.8 mm.
- If the wear limit is exceeded, repeat the measurement with new valves.
- Renew cylinder head if wear limit is still exceeded.





Valve guides cannot be renewed.

5.2 Checking valves

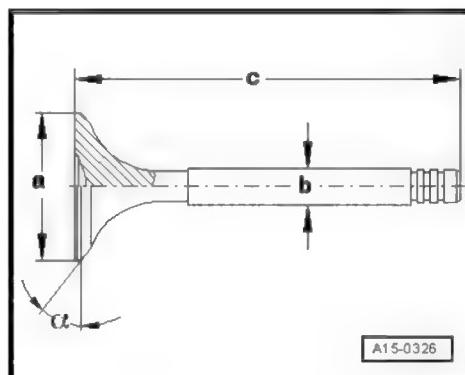
- Visually inspect for scoring on valve stems and contact surfaces.
- Renew valve if scoring is clearly visible.

5.3 Valve dimensions



Inlet and exhaust valves must not be machined. Only grinding-in is permitted.

Dimension	Inlet valve	Exhaust valve
Ø a mm	33.85 ± 0.10	28.0 ± 0.1
Ø b mm	5.98 ± 0.01	5.96 ± 0.01
c mm	104.0 ± 0.2	101.9 ± 0.2
a °	45	45



WARNING

- ◆ Care must be taken when disposing of old sodium-cooled exhaust valves.
- ◆ The valves must be sawn in two with a metal saw between the centre of the stem and valve head. When doing so, the valves must not come into contact with water. After preparing the valves, throw a maximum of ten into a bucket of water. Then step away immediately, since a chemical reaction will occur in which the sodium filling burns.
- ◆ After performing these steps the valves can be disposed of in the normal way.



17 – Lubrication

1 Sump/oil pump

- ⇒ [“1.1 Exploded view - sump/oil pump”, page 177](#)
- ⇒ [“1.2 Engine oil”, page 180](#)
- ⇒ [“1.3 Removing and installing sump \(bottom section\)”, page 181](#)
- ⇒ [“1.4 Removing and installing sump \(top section\)”, page 183](#)
- ⇒ [“1.5 Removing and installing oil pump”, page 185](#)
- ⇒ [“1.6 Removing and installing oil level and oil temperature sender G266 ”, page 186](#)

1.1 Exploded view - sump/oil pump



Note

- ◆ If large quantities of metal shavings or abrasion are found when performing engine repairs, this may be an indication of damage to the crankshaft or conrod bearings. To prevent further damage, the following steps are required after completion of repair work: clean the oil passages carefully and renew the oil spray jets, engine oil cooler and oil filter.
- ◆ Oil spray jet for piston cooling ⇒ [Fig. “Oil spray jet for piston cooling”](#), page 102 .



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1 - Nut

- 9 Nm

2 - Oil level and oil temperature sender - G266-

- Removing and installing
 ⇒ "1.6 Removing and installing oil level and oil temperature sender G266", page 186

3 - Seal

- Renew

4 - Sump (bottom section)

- Removing and installing
 ⇒ "1.3 Removing and installing sump (bottom section)", page 181

5 - Bolt

- Steel bolts:

◆ 9 Nm

- Aluminium bolts:

◆ Renew

◆ 3 Nm +90°

6 - Baffle plate (bottom)

7 - Bolt

- Renew

- Tightening torque and sequence ⇒ Fig. "Sump (top section) - tightening torque and sequence", page 180

8 - Sump (top section)

- Removing and installing ⇒ "1.4 Removing and installing sump (top section)", page 183

9 - Dowel sleeve Protected by copyright. Copying for private or commercial purposes, in part or in whole, is only permitted unless authorised by AUDI AG. AUDI AG does not guarantee the correctness of information in this document. Reference to non-AUDI products may include trademarks of their respective owners.

- 2x

permitted unless authorised by AUDI AG. AUDI AG does not guarantee the correctness of information in this document. Reference to non-AUDI products may include trademarks of their respective owners.

10 - O-ring

with respect to the correctness of information in this document. Reference to non-AUDI products may include trademarks of their respective owners.

- Renew

- Insert in retaining frame

11 - Bolt

- Clean threaded holes for bolts

- Apply locking fluid when installing; refer to ⇒ Electronic parts catalogue

- Steel bolts:

◆ 9 Nm

- Aluminium bolts:

◆ Renew

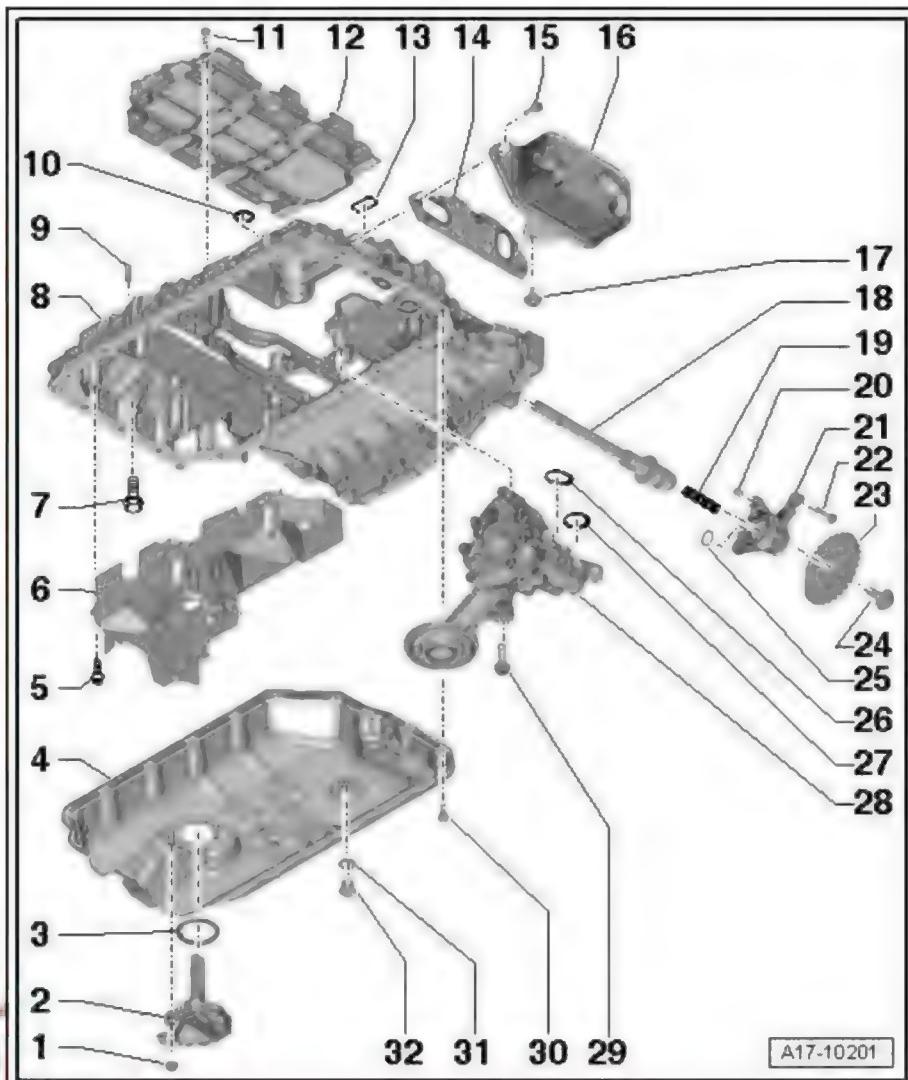
◆ 3 Nm +90°

12 - Baffle plate (top)

13 - Seal

- Insert in retaining frame

- Renew



14 - Gasket

- Renew

15 - Bolt

- Renew
- 3 Nm +90°

16 - Engine oil cooler

- With oil cooler bypass valve
- See note [⇒ page 177](#)
- Removing and installing ⇒ “[2.1 Removing and installing engine oil cooler](#)”, page 187

17 - Bolt

- 9 Nm

18 - Drive shaft

- For oil pump

19 - Compression spring

20 - Sleeve

- 2x

21 - Mounting bracket

22 - Bolt

- 9 Nm

23 - Chain sprocket

- For oil pump
- Can only be fitted in one position on drive shaft

24 - Bolt

- Renew
- To loosen and tighten, use pin wrench - 3212- to counterhold chain sprocket
- 30 Nm +90°

25 - O-ring

- Renew

26 - Seal

- Renew

27 - O-ring

- Renew

28 - Oil pump

- Do not dismantle
- Removing and installing ⇒ “[1.5 Removing and installing oil pump](#)”, page 185

29 - Bolt

- 20 Nm

30 - Bolt

- Renew
- Tightening torque and sequence ⇒ Fig. “[“Sump \(bottom section\) - tightening torque and sequence”](#)”, [page 180](#)

31 - Seal

- Renew

32 - Oil drain plug

- 30 Nm



Sump (bottom section) - tightening torque and sequence

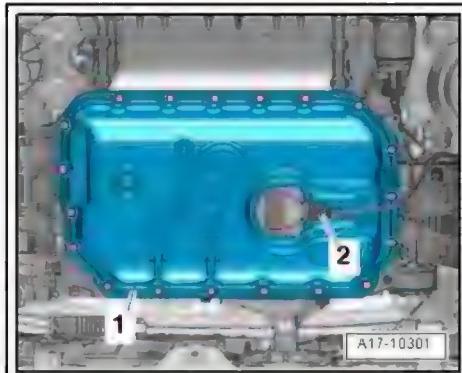


Renew the bolts tightened with specified tightening angle.

- Tighten bolts in 2 stages as follows:

For steel bolts

Stage	Tightening torque/angle specification
1.	8 Nm in diagonal sequence
2.	Turn 90° further in diagonal sequence



For aluminium bolts

Stage	Tightening torque/angle specification
1.	3 Nm in diagonal sequence
2.	Turn 90° further in diagonal sequence

Sump (top section) - tightening torque and sequence

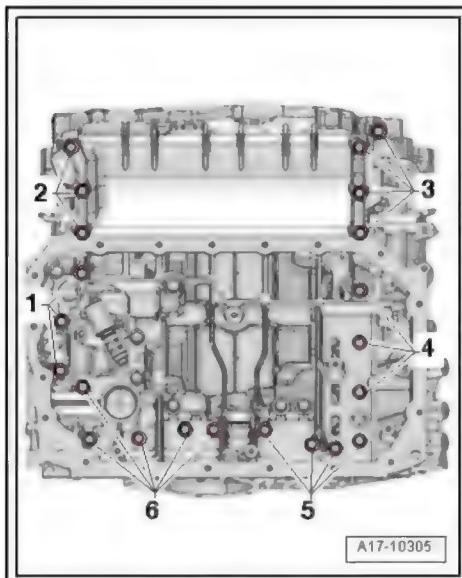


Renew the bolts tightened with specified tightening angle.

- Tighten bolts in the following sequence:

For steel bolts

Thread of bolt	Tightening torque
M7 -1 ... 6-	Screw in by hand until they make contact, tighten in stages and in diagonal sequence (final torque: 16 Nm)
M8 -1 ... 6-	Screw in by hand until they make contact, tighten in stages and in diagonal sequence (final torque: 20 Nm)



For aluminium bolts

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 6-	Screw in by hand until contact is made
2.	-1 ... 6-	8 Nm
3.	-1 ... 6-	Turn 90° further

1.2 Engine oil

Oil capacities, oil specifications and viscosity grades ⇒ Maintenance tables .



Caution

Risk of damage to catalytic converter.

- ◆ The oil level must not be above the "MAX" mark on the dipstick.

1.3 Removing and installing sump (bottom section)

Special tools and workshop equipment required

- ◆ Electric drill with plastic brush
- ◆ Safety goggles
- ◆ Sealant ⇒ Electronic parts catalogue

Removing

- Engine oil drained ⇒ Maintenance ; Booklet 411



Note

Lay a cloth under the engine oil cooler to catch escaping engine oil.

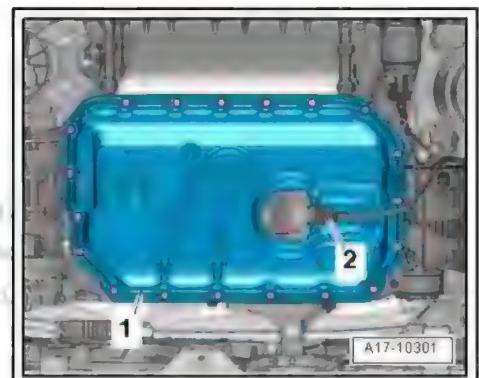
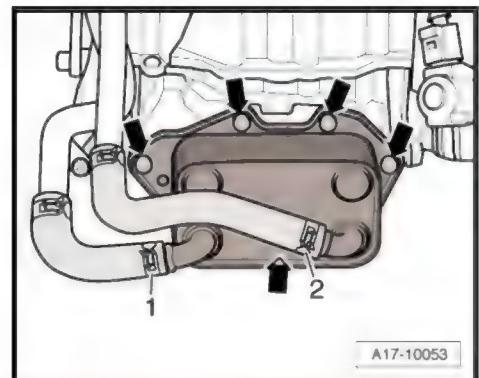
- Remove bolts -arrows- and tie up engine oil cooler to one side with coolant hoses -1- and -2- attached.
- Unplug electrical connector -2- at oil level and oil temperature sender - G266- and move electrical wiring clear.
- Remove bolts for sump (bottom section) -1-.
- Release sump (bottom section) from bonded joint, taking care not to bend sump.

Installing



Note

- ◆ Renew seals.
- ◆ The sump (bottom section) must be renewed if its coating is damaged or if it is bent.



Caution

Protect lubrication system and bearings against contamination.

- ◆ Cover exposed parts of the engine.



WARNING

Risk of eye injury due to sealant residue.

- Put on safety goggles.

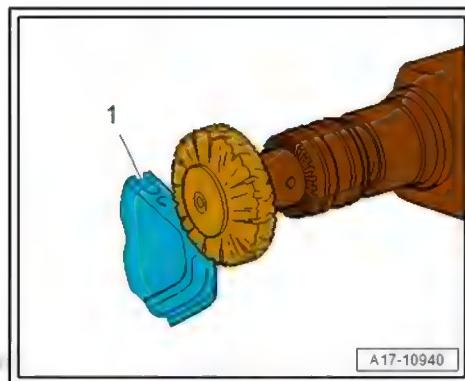
- Remove remaining sealant on bottom section and top section of sump -1- with a rotating plastic brush or similar.



Note

Take care not to damage the coating on the sump (bottom section).

- Clean surfaces; they must be free of oil and grease.



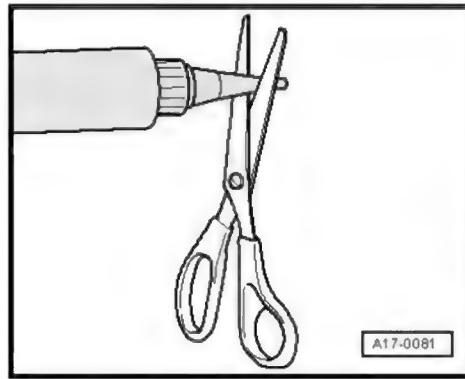
A17-10940



Note

Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle Ø approx. 1 mm).



A17-0081

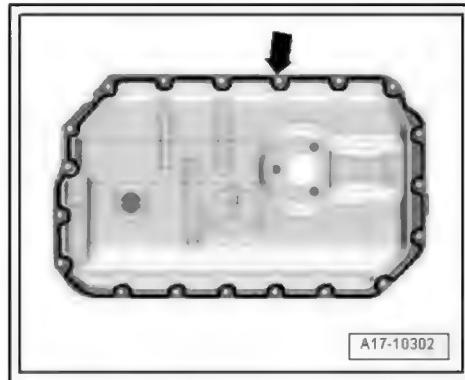


Caution

Make sure lubrication system is not clogged by excess sealant.

- ◆ The sealant bead must not be thicker than specified.

- Apply bead of sealant -arrow- onto clean sealing surface of sump (bottom section) as illustrated.
Width of sealant bead: approx. 1.5 mm.



A17-10302



Note

The sump (bottom section) must be installed within 5 minutes after applying the sealant.

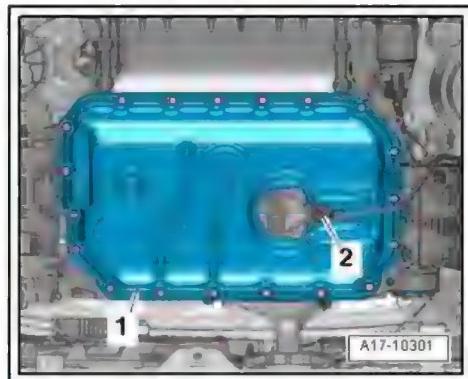
- Fit sump (bottom section) and tighten bolts [⇒ page 180](#) .

Remaining installation steps are carried out in reverse sequence; note the following:

- Install engine oil cooler [⇒ page 187](#) .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 411 .

Tightening torques

- ◆ [⇒ Fig. ““Sump \(bottom section\) - tightening torque and sequence””, page 180](#)
- ◆ Anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe



1.4 Removing and installing sump (top section)

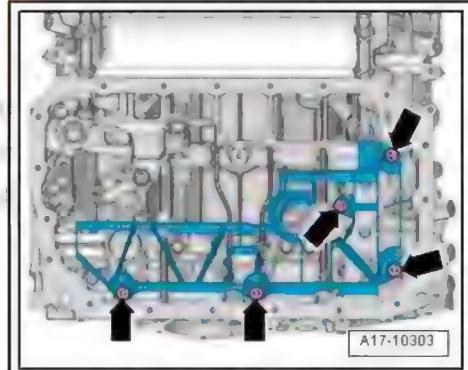
Special tools and workshop equipment required

- ◆ Safety goggles
- ◆ Electric drill with plastic brush
- ◆ Sealant ⇒ Electronic parts catalogue

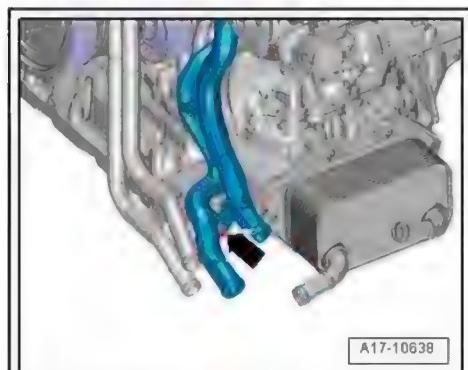
Removing

- Engine secured to engine and gearbox support [⇒ page 47](#)
- Remove timing chain cover (bottom) [⇒ page 112](#) .
- Remove oil pump [⇒ page 185](#) .
- Remove bolts -arrows- and detach baffle plate (bottom).

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- Remove bolt -arrow- for coolant pipes (left-side).



- Remove bolts -1 ... 6- for sump (top section).
- Carefully release sump (top section) from bonded joint and pry sump off dowel pins on cylinder block.

Installing



Note



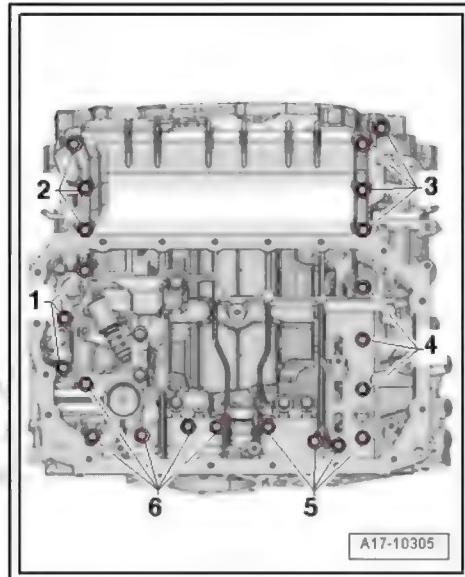
Renew gasket and O-ring.



Caution

Protect lubrication system and bearings against contamination.

- ◆ Cover exposed parts of the engine.



A17-10305

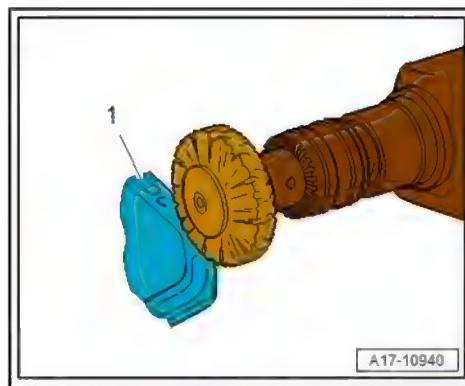
- Remove old sealant from grooves on sump (top section) and from sealing surfaces.



WARNING

Risk of eye injury due to sealant residue.

- Put on safety goggles.



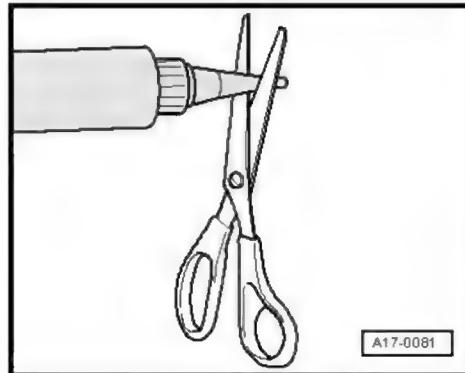
A17-10940



Note

Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle Ø approx. 1.5 mm).



A17-0081



Caution

Make sure lubrication system is not clogged by excess sealant.

- ◆ *The sealant bead must not be thicker than specified.*

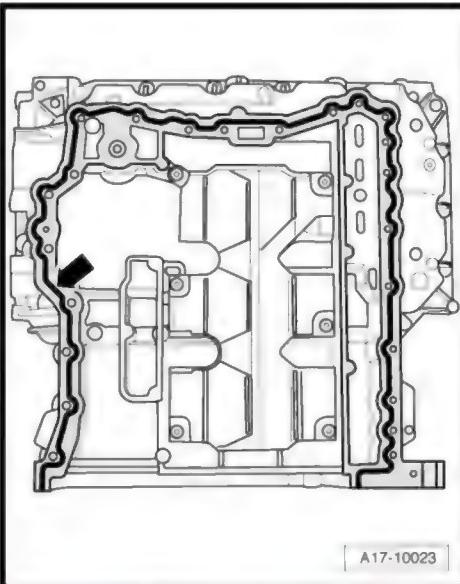
- Apply bead of sealant -arrow- onto clean sealing surface of sump (top section) as shown in illustration.
- The grooves on the sealing surfaces must be completely filled with sealant.
- The bead of sealant must project 1.5 ... 2.0 mm above the sealing surface.



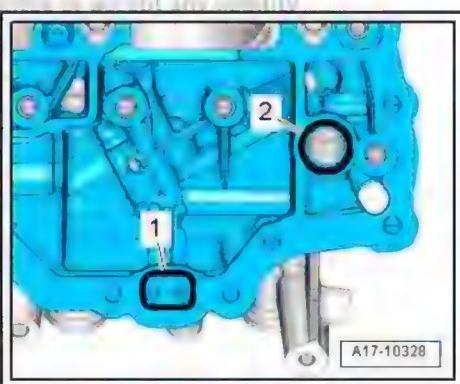
Note

The sump (top section) must be installed within 5 minutes after applying the sealant.

- Fit seal -1- and O-ring -2- in retaining frame.



A17-10023



A17-10328

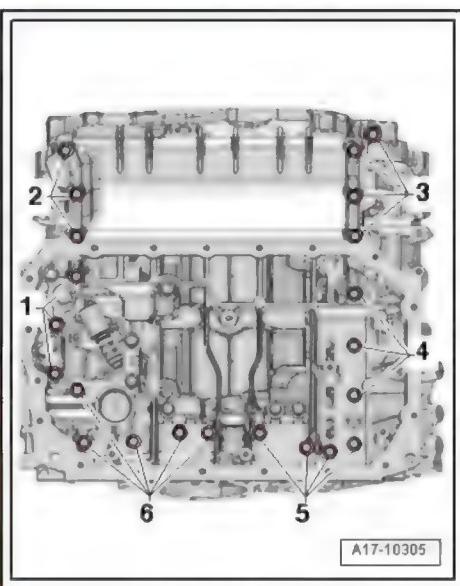
- Check that dowel sleeves are fitted, fit sump (top section) and tighten bolts [⇒ page 180](#).

Remaining installation steps are carried out in reverse sequence; note the following:

- Secure coolant pipes (left-side) [⇒ page 225](#).
- Install oil pump [⇒ page 185](#).
- Install timing chain cover (bottom) [⇒ page 112](#).

Tightening torques

- ◆ [⇒ "1.1 Exploded view - sump/oil pump", page 177](#)
- ◆ [⇒ Fig. ""Sump \(top section\) - tightening torque and sequence"", page 180](#)



A17-10305

1.5 Removing and installing oil pump

Removing

- Remove sump (bottom section) [⇒ page 181](#).
- Remove bolts -arrows-.
- Pull oil pump forwards off drive shaft.

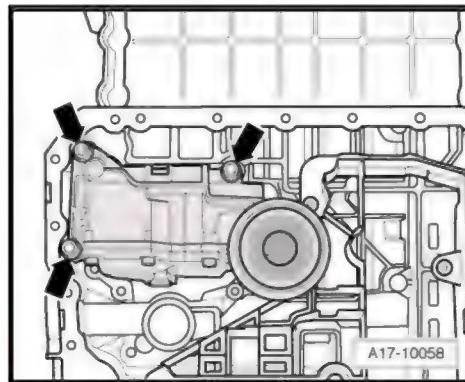
Installing

Installation is carried out in reverse order; note the following:



Note

Renew gasket and O-ring.



- Fit oil pump onto drive shaft and tighten bolts.
- Install sump (bottom section) [⇒ page 181](#).
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 411 .

Tightening torques

- ◆ [⇒ "1.1 Exploded view - sump/oil pump", page 177](#)

1.6 Removing and installing oil level and oil temperature sender - G266-

Removing

- Engine oil drained ⇒ Maintenance ; Booklet 411
- Unplug electrical connector -2-.
- Remove nuts -1- and detach oil level and oil temperature sender - G266- -item 3-.

Installing

Installation is carried out in reverse order; note the following:



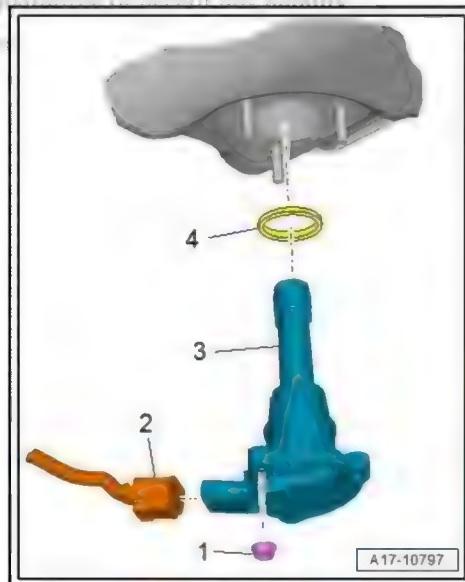
Note

Renew seal -4-.

- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 411 .

Tightening torques

- ◆ [⇒ "1.1 Exploded view - sump/oil pump", page 177](#)



2 Engine oil cooler

⇒ "2.1 Removing and installing engine oil cooler", page 187

2.1 Removing and installing engine oil cooler

Special tools and workshop equipment required

- ◆ Used oil collection and extraction unit - VAS 6622A-



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W00-11526

Removing

- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Drain coolant ⇒ page 205 .
- Detach coolant hose -1- and, if necessary, -2- from engine oil cooler; release hose clip to do so.
- Position used oil collection and extraction unit - VAS 6622A- below engine.
- Unscrew bolts -arrows- and detach engine oil cooler.

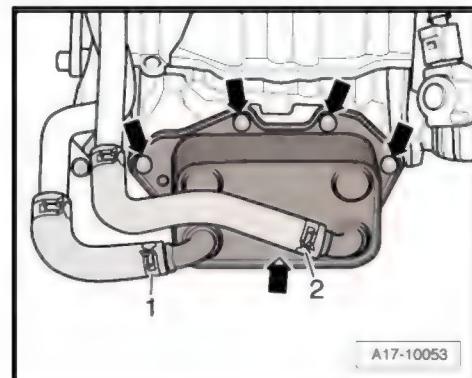
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ Renew gasket.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- Check oil level ⇒ Maintenance ; Booklet 411 .



A17-10053



Note

Do not reuse coolant.

- Fill up with coolant ⇒ page 207 .

Tightening torques

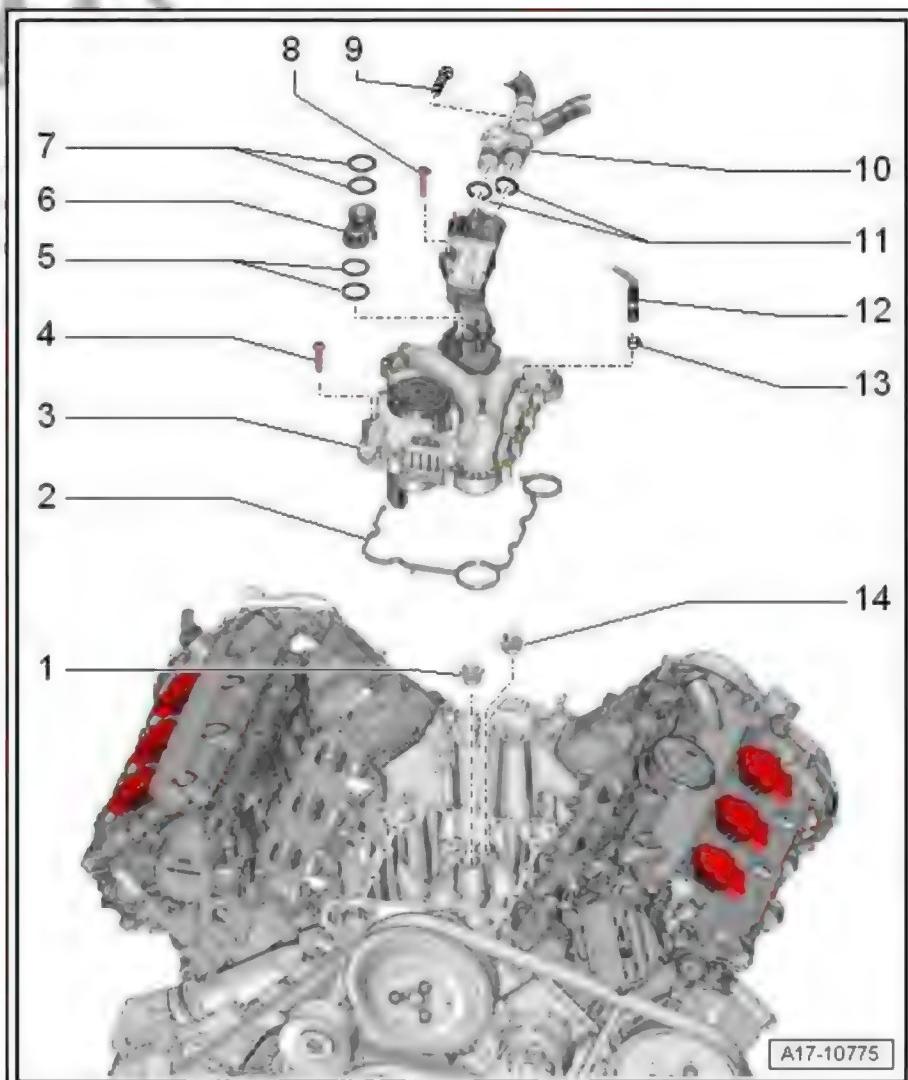
- ◆ ⇒ "1.1 Exploded view - sump/oil pump", page 177

3 Crankcase breather

- ⇒ “3.1 Exploded view - crankcase breather system”, page 188
- ⇒ “3.2 Removing and installing crankcase breather hoses”, page 189
- ⇒ “3.3 Removing and installing oil separator”, page 190

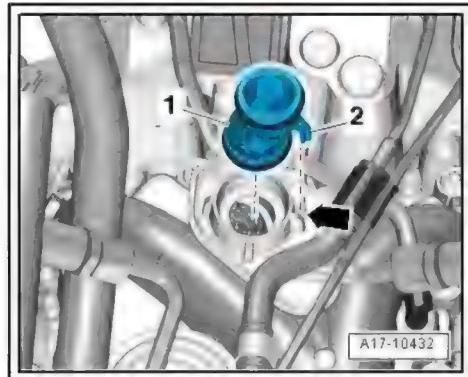
3.1 Exploded view - crankcase breather system

- 1 - Plug
 - 20 Nm
- 2 - Gasket
 - Renew
- 3 - Cover with oil separator
 - With connection for crankcase breather
 - Removing and installing
⇒ “3.3 Removing and installing oil separator”, page 190
- 4 - Bolt
 - 9 Nm
- 5 - O-ring
 - Renew
 - USA models: 2x
- 6 - Connection
 - For crankcase breather
 - Installation position ⇒ Fig. ““Installing connection for crankcase breather””, page 188
- 7 - O-ring
 - Renew
 - USA models: 2x
- 8 - Bolt
 - 2.5 Nm
- 9 - Bolt
 - 2.5 Nm
- 10 - Crankcase breather hoses
 - To cylinder head covers
 - Removing and installing ⇒ “3.2 Removing and installing crankcase breather hoses”, page 189
- 11 - O-rings
 - Renew
- 12 - Crankcase breather hose
 - To air pipe
- 13 - Hose clip
- 14 - Plug
 - 20 Nm



Installing connection for crankcase breather

- Insert connection -1- for crankcase breather with new O-rings in cover for oil separator.
- Installation position: lug -2- must engage in guide -arrow-.



3.2 Removing and installing crankcase breather hoses

⇒ "3.2.1 Removing and installing crankcase breather hoses, rest-of-world vehicles", page 189

⇒ "3.2.2 Renewing crankcase breather hoses, USA vehicles", page 189

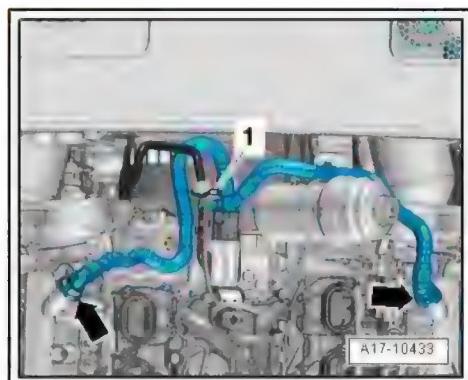
3.2.1 Removing and installing crankcase breather hoses, rest-of-world vehicles

Removing



Fit all cable ties in the original positions when installing.

- Remove supercharger ⇒ page 259 .
- Detach crankcase breather hoses -arrows- from cylinder head covers.
- Move crankcase breather hoses clear.
- Remove bolt -1- and detach connection with crankcase breather hoses.



Installing

Installation is carried out in reverse order; note the following:



Fit new O-rings.

- Install supercharger ⇒ page 259 .

Tightening torques

◆ ⇒ "3.1 Exploded view - crankcase breather system", page 188

3.2.2 Renewing crankcase breather hoses, USA vehicles



Caution

Risk of violating emission legislation applying to USA models.

- ◆ Crankcase breather hoses cannot be removed without being irreparably damaged. Once removed, they must be renewed.

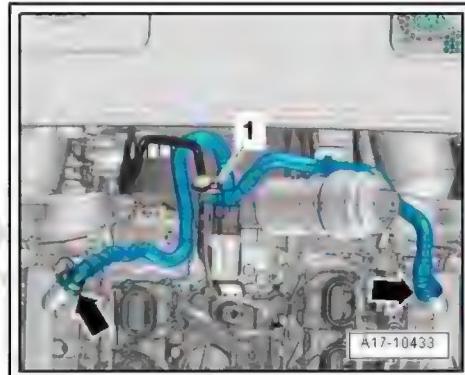
Removing



Note

Fit all cable ties in the original positions when installing.

- Remove supercharger [page 259](#).
- Detach crankcase breather hoses -arrows- from cylinder head covers.
- Move crankcase breather hoses clear.
- Remove bolt -1- and detach connection with crankcase breather hoses.



Installing

Installation is carried out in reverse order; note the following:



Note

Fit new O-rings.

- Install supercharger [page 259](#).

Tightening torques

- ◆ ["3.1 Exploded view - crankcase breather system", page 188](#)

3.3 Removing and installing oil separator

Removing

- Remove crankcase breather hoses [page 189](#).
- Remove coolant pipe (top) [page 232](#).
- Remove intake manifold (bottom section, left-side) [page 300](#).

- Remove bolts -arrows-.
- Detach bracket for high-pressure pipes and cover -1- with oil separator.

Installing

Installation is carried out in reverse order; note the following:

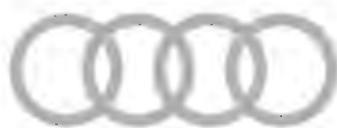
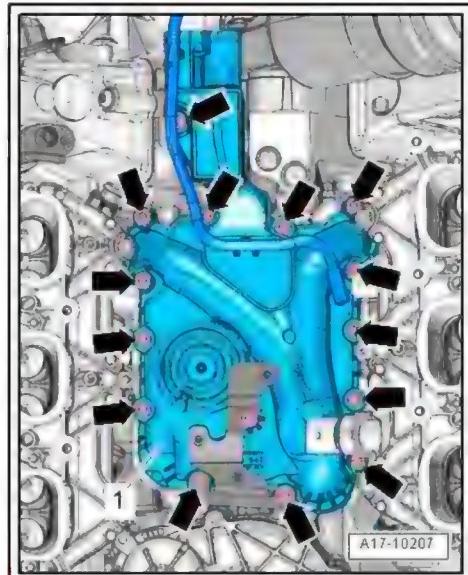


Renew gasket.

- Install intake manifold (bottom section) [⇒ page 300](#).
- Install coolant pipe (top) [⇒ page 232](#).
- Install crankcase breather hoses [⇒ page 189](#).

Tightening torques

- ◆ [⇒ "3.1 Exploded view - crankcase breather system", page 188](#)



4 Oil filter/oil pressure switches

⇒ "4.1 Exploded view - oil filter housing/oil pressure switch", page 192

⇒ "4.2 Removing and installing oil pressure switch F22", page 193

⇒ "4.3 Removing and installing oil pressure switch for reduced oil pressure F378", page 194

⇒ "4.4 Checking oil pressure", page 195

⇒ "4.5 Removing and installing oil filter housing", page 196

⇒ "4.6 Removing and installing valve for oil pressure control N428", page 198

4.1 Exploded view - oil filter housing/oil pressure switch

1 - Bolt

- 13 Nm

2 - Oil pressure switch - F22-

- Opening/closing pressure 2.5 ... 3.2 bar
- With grey insulation
- Check in Guided Fault Finding ⇒ Vehicle diagnostic tester
- Removing and installing
⇒ "4.2 Removing and installing oil pressure switch F22", page 193
- 20 Nm

3 - Seal

- Renew

4 - Flange nut

- 13 Nm

5 - Bolt

- 9 Nm

6 - Sleeve

7 - Rubber grommet

8 - Oil filter housing

- With filter bypass valve
- With oil retention valve
- The oil retention valve cannot be renewed

9 - O-ring

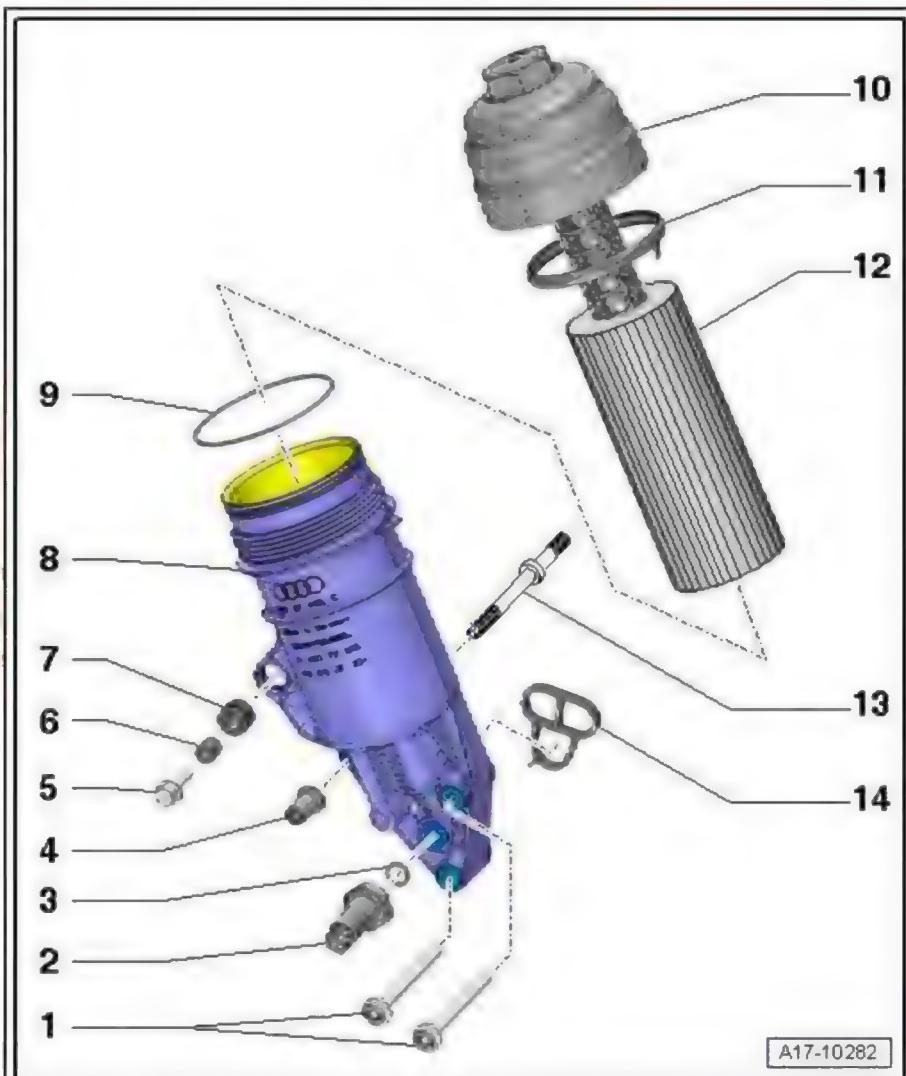
- Renew

⇒ Fig. "Installing O-ring on oil filter housing", page 193

10 - Sealing cap

- 25 Nm

11 - Seal



- Renew
- Removing and installing ⇒ Fig. “Renewing seal on sealing cap” , page 193

12 - Oil filter element

- Removing and installing ⇒ Maintenance ; Booklet 411

13 - Bolt

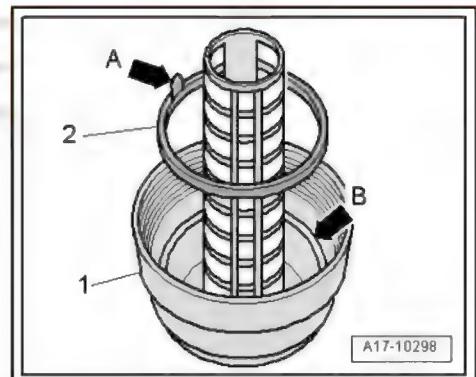
- Tightening torque ⇒ Fig. “Timing chain cover (bottom) - tightening torque and sequence” , page 108

14 - Gasket

- Renew

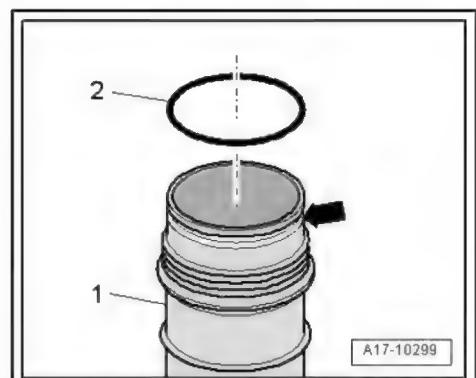
Renewing seal on sealing cap

- Take hold of tab -arrow A- and pull seal -2- out of sealing cap -1-.
- Install new seal so that semi-circular profile fits in groove -arrow B- in sealing cap.
- Lug -arrow A- must point upwards.



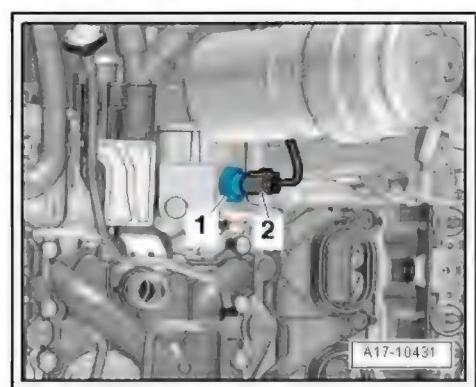
Installing O-ring on oil filter housing

- Fit O-ring -2- in groove -arrow- on oil filter housing -1-.



Oil pressure switch for reduced oil pressure - F378-

- 1 - Oil pressure switch for reduced oil pressure - F378-
 - ◆ Opening/closing pressure 0.75 ... 1.05 bar
 - ◆ With grey insulation
 - ◆ Check in **Guided Fault Finding** ⇒ Vehicle diagnostic tester
 - ◆ Removing and installing ⇒ [page 194](#)
 - ◆ 20 Nm



4.2 Removing and installing oil pressure switch - F22-

Special tools and workshop equipment required

- ◆ Socket, 24 mm - T40284-



Removing

- Remove engine cover panel (rear) [⇒ page 67](#).



Note

Place a cloth beneath the oil filter housing to catch escaping oil.

- Unplug electrical connector -arrow-.
- Unscrew oil pressure switch - F22-.

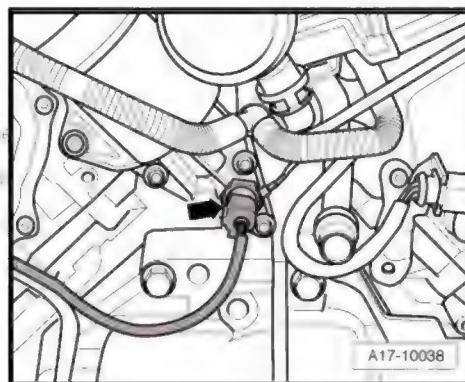
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ Renew seal.
- ◆ Fit the new oil pressure switch - F22- into the connection immediately to avoid loss of oil.
- Check oil level ⇒ Maintenance ; Booklet 411 .



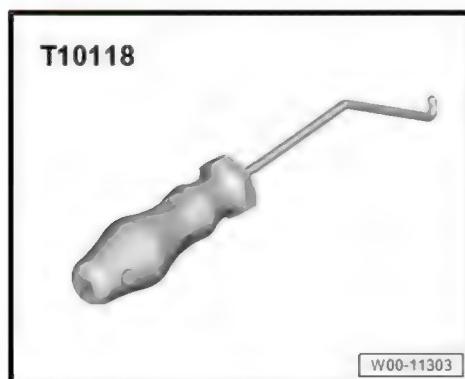
Tightening torques

- ◆ [⇒ "4.1 Exploded view - oil filter housing/oil pressure switch", page 192](#)

4.3 Removing and installing oil pressure switch for reduced oil pressure - F378-

Special tools and workshop equipment required

- ◆ Assembly tool - T10118-



- ◆ Articulated wrench, 24 mm - T40175-



W00-11242

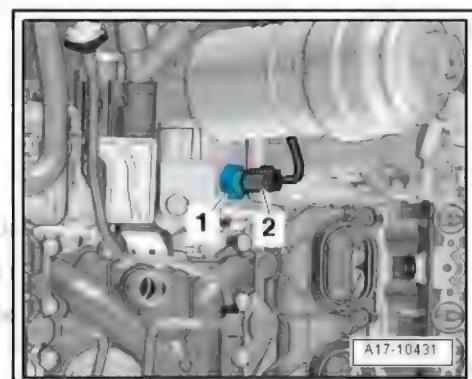
Removing

- Remove engine cover panel (rear) [⇒ page 67](#).
- Take out noise insulation.
- Use assembly tool - T10118- to unplug electrical connector -2-.
- Use articulated wrench (24 mm) ⁽¹⁾ T40175- to unscrew oil pressure switch for reduced oil pressure - F378- -item 1-



Note

For illustration purposes, the installation position is shown with the supercharger removed.



A17-10431

Installing

Installation is carried out in reverse order; note the following:



Note

Renew seal.

Tightening torques

- ◆ [⇒ Fig. "" Oil pressure switch for reduced oil pressure -F378- "", page 193](#)

4.4 Checking oil pressure

Special tools and workshop equipment required

- ◆ Oil pressure tester - V.A.G 1342-



W00-11173

Procedure

- Oil level OK

- Engine oil temperature approx. 80 °C
- Remove oil pressure switch - F22- [⇒ page 193](#).
- Connect oil pressure tester - V.A.G 1342- to bore for oil pressure switch.
- Screw oil pressure switch - F22- into oil pressure tester.
- Start engine.
- Minimum oil pressure at idling speed: 1.2 bar.
- Minimum oil pressure at 2000 rpm: 1.5 bar.

Assembling

- Install oil pressure switch - F22- [⇒ page 193](#).

4.5 Removing and installing oil filter housing

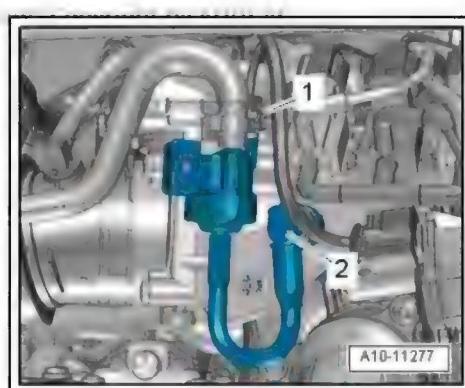
Special tools and workshop equipment required

- ◆ Used oil collection and extraction unit - VAS 6622A-



Removing

- Remove engine cover panel (rear) [⇒ page 67](#).
- Remove oil filter element ⇒ Maintenance ; Booklet 411 .
- Extract engine oil from oil filter housing using used oil collection and extraction unit - VAS 6622A-.
- Unplug electrical connector -1- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -2- (press release tabs).
- Take activated charcoal filter solenoid valve 1 - N80- out of bracket and move to side with hose attached.



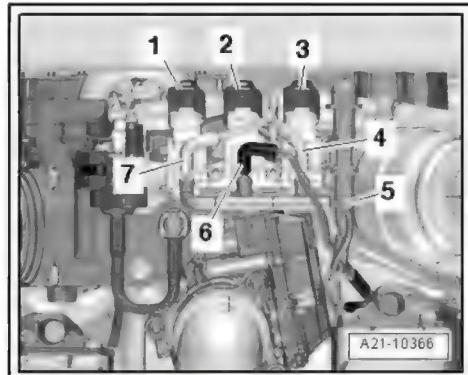
- Unplug electrical connectors -1, 2, 3-.



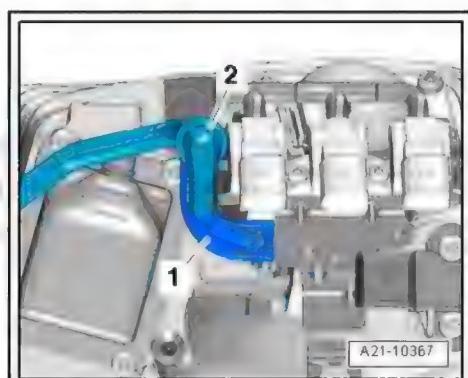
Note

Mark position of vacuum hoses for re-installation.

- Disconnect vacuum hoses -4 ... 7-.



- Move clear vacuum hose -2- leading to brake servo at bracket -1-.



- Remove bolts -arrows- and move bracket -1- with change-over valves to one side.

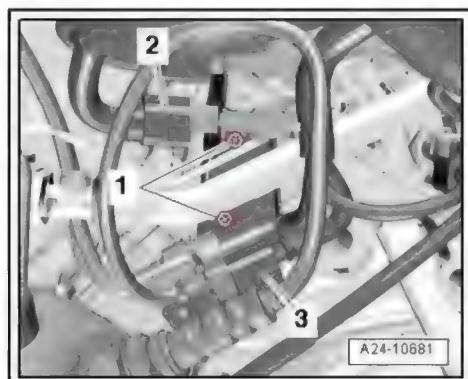


- Move electrical wiring clear.
- Remove bolts -1- and move bracket with electrical connectors to one side.



Note

Disregard items -2 and 3-.



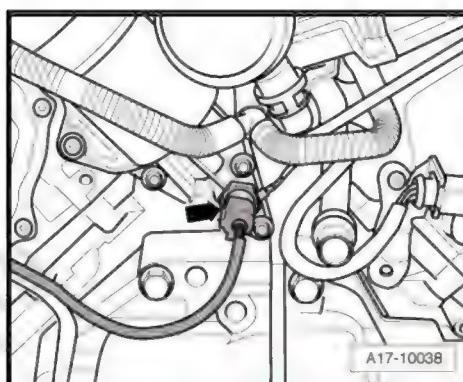


Note

Place a cloth beneath the oil filter housing to catch escaping oil.

- Unplug electrical connector -arrow- on oil pressure switch - F22- .

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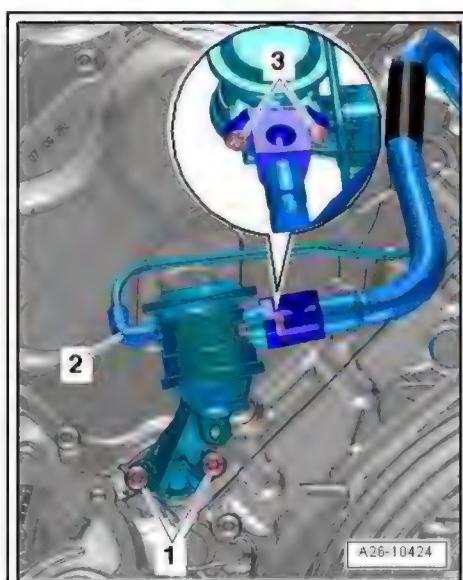


- Remove bolts -3- and push secondary air hose to rear.



Note

Disregard items -1 and 2-.



- Remove bolts -arrows-.
- Remove nut -1- and unscrew centre hex stud.
- Remove oil filter housing with centre hex stud.

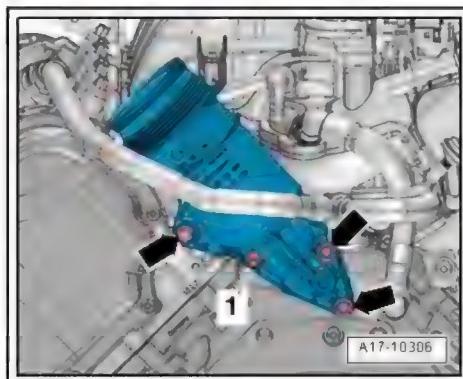
Installing

Installation is carried out in reverse order; note the following:



Note

Renew seals, gasket and O-ring.



- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install oil filter element, fill up with engine oil and check oil level ⇒ Maintenance ; Booklet 411 .

Tightening torques

- ◆ ⇒ ["4.1 Exploded view - oil filter housing/oil pressure switch"](#), page 192
- ◆ ⇒ ["3.1 Exploded view - secondary air system"](#), page 344
- ◆ ⇒ ["1.1 Exploded view - supercharger"](#), page 257

4.6 Removing and installing valve for oil pressure control - N428-

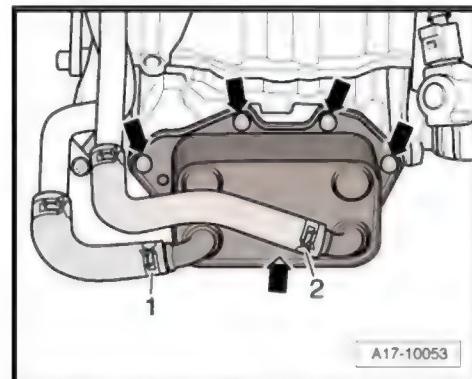
Special tools and workshop equipment required

- ◆ Used oil collection and extraction unit - VAS 6622A-



Removing

- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Position used oil collection and extraction unit - VAS 6622A- below engine.
- Remove bolts -arrows- and tie up engine oil cooler to one side with coolant hoses -1- and -2- attached.



- Unplug electrical connector -1-.
- Remove bolt -3- and detach valve for oil pressure control - N428- -item 4-.

Installing

Installation is carried out in reverse order; note the following:

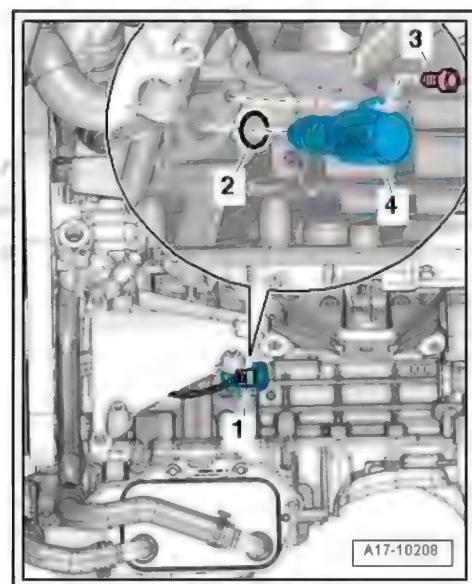


Fit new O-ring -2-.

- Install engine oil cooler ⇒ [page 187](#) .

Tightening torques

- ◆ ⇒ Fig. "Valve for oil pressure control -N428- ", page 93
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation



19 – Cooling

1 Cooling system/coolant

⇒ “1.1 Connection diagram - coolant hoses”, page 200

⇒ “1.2 Checking cooling system for leaks”, page 203

⇒ “1.3 Draining and filling cooling system”, page 205

1.1 Connection diagram - coolant hoses

⇒ “1.1.1 Connection diagram - coolant hoses, vehicles without auxiliary heater”, page 200

⇒ “1.1.2 Connection diagram - coolant hoses, vehicles with auxiliary heater”, page 202

1.1.1 Connection diagram - coolant hoses, vehicles without auxiliary heater



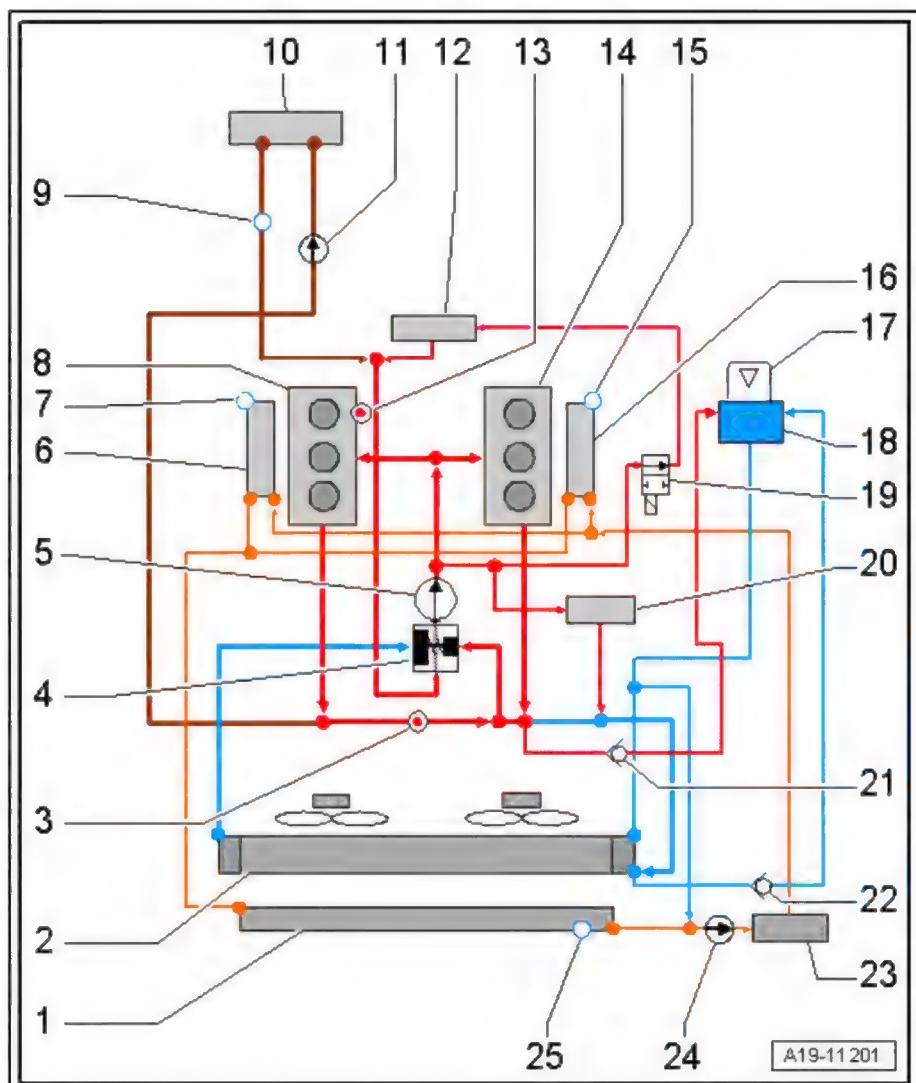
Note

- ◆ Blue = Large coolant circuit
- ◆ Red = Small coolant circuit
- ◆ Orange = Coolant circuit for charge air cooler.
- ◆ Brown = Heating circuit
- ◆ Arrows show direction of coolant flow.



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- 1 - Water radiator (front) for charge air cooling circuit
- 2 - Radiator
- 3 - Coolant temperature sender - G62-
- 4 - Thermostat
- 5 - Coolant pump
- 6 - Charge air cooler (right-side)
 - In supercharger housing
- 7 - Bleeder screw
- 8 - Cylinder head
 - Cylinder bank 1 (right-side)
- 9 - Bleeder screw
- 10 - Heat exchanger for heater
 - Removing and installing
⇒ Heating, air conditioning; Rep. gr. 87 ; Front air conditioning unit; Removing and installing heat exchanger
- 11 - Coolant circulation pump - V50-
 - Removing and installing
⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit; Overview of fitting locations - coolant circuit

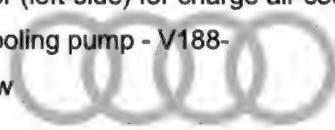


- 12 - ATF cooler
 - Removing and installing ⇒ Rep. gr. 34 ; ATF circuit; Removing and installing ATF cooler /⇒ Rep. gr. 37 ; ATF circuit; Removing and installing ATF cooler .
- 13 - Temperature sender for engine temperature regulation - G694-
- 14 - Cylinder head
 - Cylinder bank 2 (left-side)
- 15 - Bleeder screw
- 16 - Charge air cooler (left-side)
 - In supercharger housing
- 17 - Filler cap
 - Checking pressure relief valve ⇒ page 205
- 18 - Coolant expansion tank
- 19 - Gearbox oil cooling valve - N509-
internal part number: part number: 8E0145701A
- 20 - Engine oil cooler
internal part number: part number: 8E0145701B
- 21 - Non-return valve
 - Located in coolant hose
- 22 - Non-return valve
 - Located in coolant hose

23 - Water radiator (left-side) for charge air cooling circuit

24 - Charge air cooling pump - V188-

25 - Bleeder screw



1.1.2 Connection diagram - coolant hoses, vehicles with auxiliary heater



Note

This connection diagram is valid for vehicles with an auxiliary heater. It is not valid for vehicles without an auxiliary heater.

◆ Blue = Large coolant circuit

◆ Red = Small coolant circuit

◆ Orange = Coolant circuit for charge air cooler.

◆ Brown = Heating circuit

◆ Arrows show direction of coolant flow.

1 - Water radiator (front) for charge air cooling circuit

2 - Radiator

3 - Coolant temperature sender - G62-

4 - Thermostat

5 - Auxiliary heater

With circulation pump - V55-

Removing and installing
⇒ Auxiliary/supplementary heater; Rep. gr. 82 ; Auxiliary/supplementary heater; Removing and installing auxiliary/supplementary heater

6 - Coolant pump

7 - Charge air cooler (right-side)

In supercharger housing

8 - Bleeder screw

9 - Cylinder head

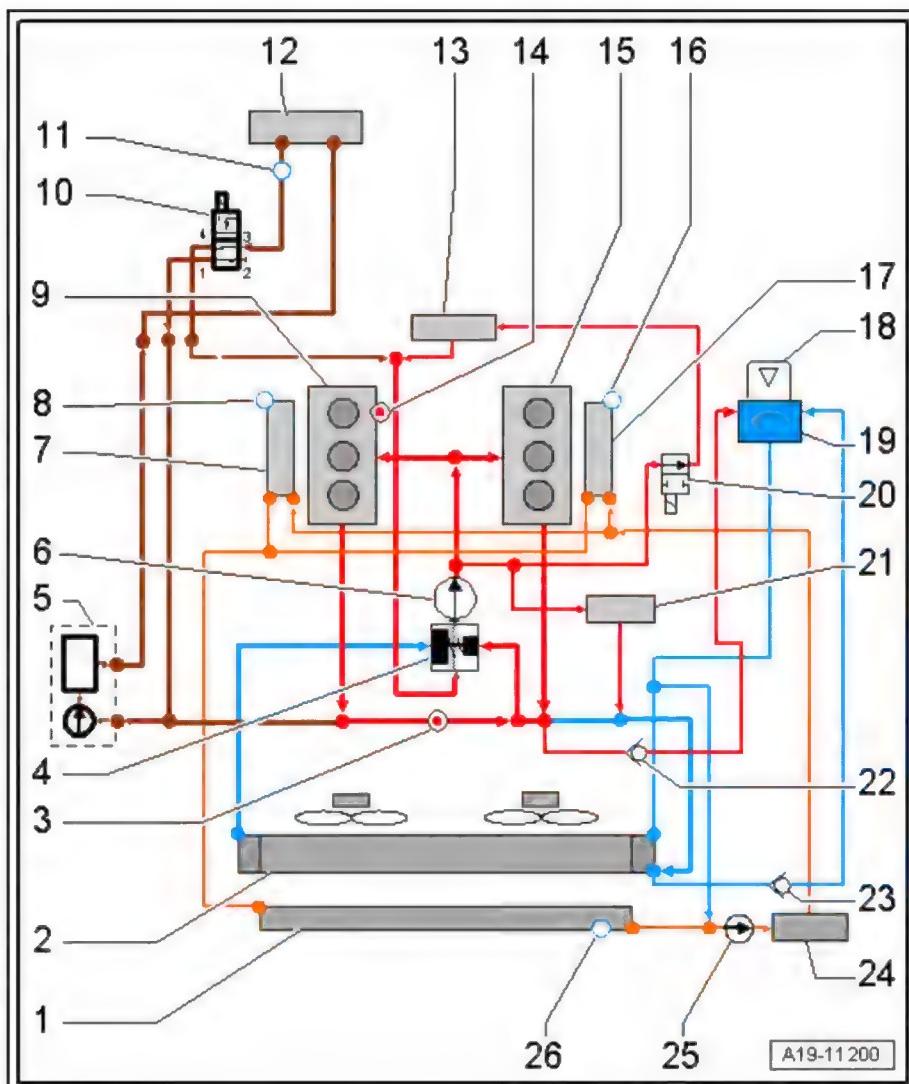
Cylinder bank 1 (right-side)

10 - Heater coolant shut-off valve - N279-

Removing and installing
⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit; Overview of fitting locations - coolant circuit

11 - Bleeder screw

12 - Heat exchanger for heater



- Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Front air conditioning unit; Removing and installing heat exchanger

13 - ATF cooler

- Removing and installing ⇒ Rep. gr. 34 ; ATF circuit; Removing and installing ATF cooler /⇒ Rep. gr. 37 ; ATF circuit; Removing and installing ATF cooler .

14 - Temperature sender for engine temperature regulation - G694-

15 - Cylinder head

- Cylinder bank 2 (left-side)

16 - Bleeder screw

17 - Charge air cooler (left-side)

- In supercharger housing

18 - Filler cap

- Checking pressure relief valve [⇒ page 205](#)

19 - Coolant expansion tank

20 - Gearbox oil cooling valve - N509-

21 - Engine oil cooler

22 - Non-return valve

- Located in coolant hose

23 - Non-return valve

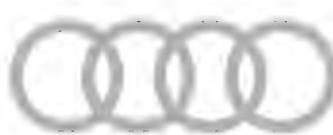
- Located in coolant hose

24 - Water radiator (left-side) for charge air cooling circuit

25 - Charge air cooling pump - V188-

26 - Bleeder screw

1.2 Checking cooling system for leaks



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Special tools and workshop equipment required



- ◆ Adapter for cooling system tester - V.A.G 1274/8-
- ◆ Adapter for cooling system tester - V.A.G 1274/9-
- ◆ Cooling system tester - V.A.G 1274 B-

Procedure

- Engine must be warm.

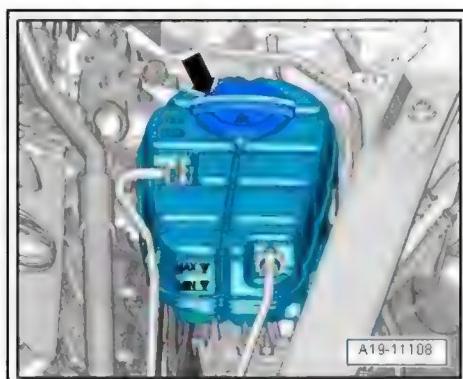


WARNING

The cooling system is under pressure when the engine is hot.
Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

- Put on protective gloves.
- Put on safety goggles.
- Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



Proceed with care! Danger of scalding due to pressure in the cooling system! Risk of damage to persons and property!

Open filler cap -arrow- on coolant expansion tank.

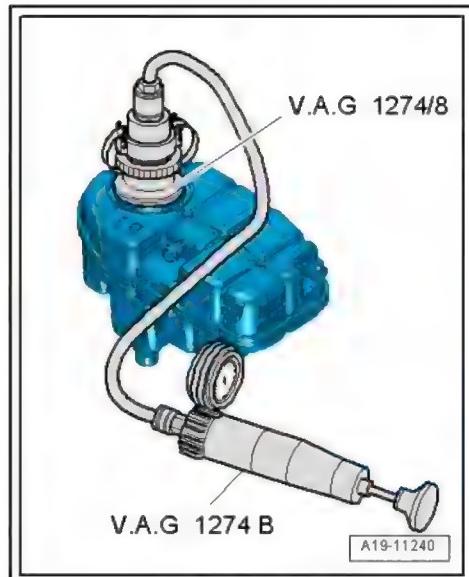
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- Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/8- onto coolant expansion tank.
- Using hand pump on cooling system tester, build up a pressure of approx. 1.5 bar.
- The pressure should not drop more than 0.2 bar within 10 minutes.
- If the pressure drops more than 0.2 bar, locate leak and eliminate fault.



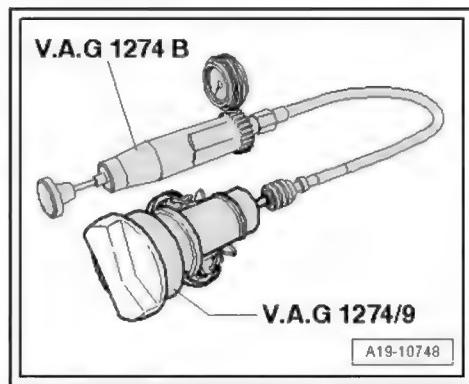
Note

The drop in pressure of 0.2 bar within 10 minutes is caused by the decrease in coolant temperature. The colder the engine is, the less the pressure will fall. If necessary, check again when the engine is cold.



Checking pressure relief valve in filler cap

- Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/9- onto filler cap.
- Build up pressure with hand pump on cooling system tester.
- The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.
- Renew filler cap if pressure relief valve does not open as described.

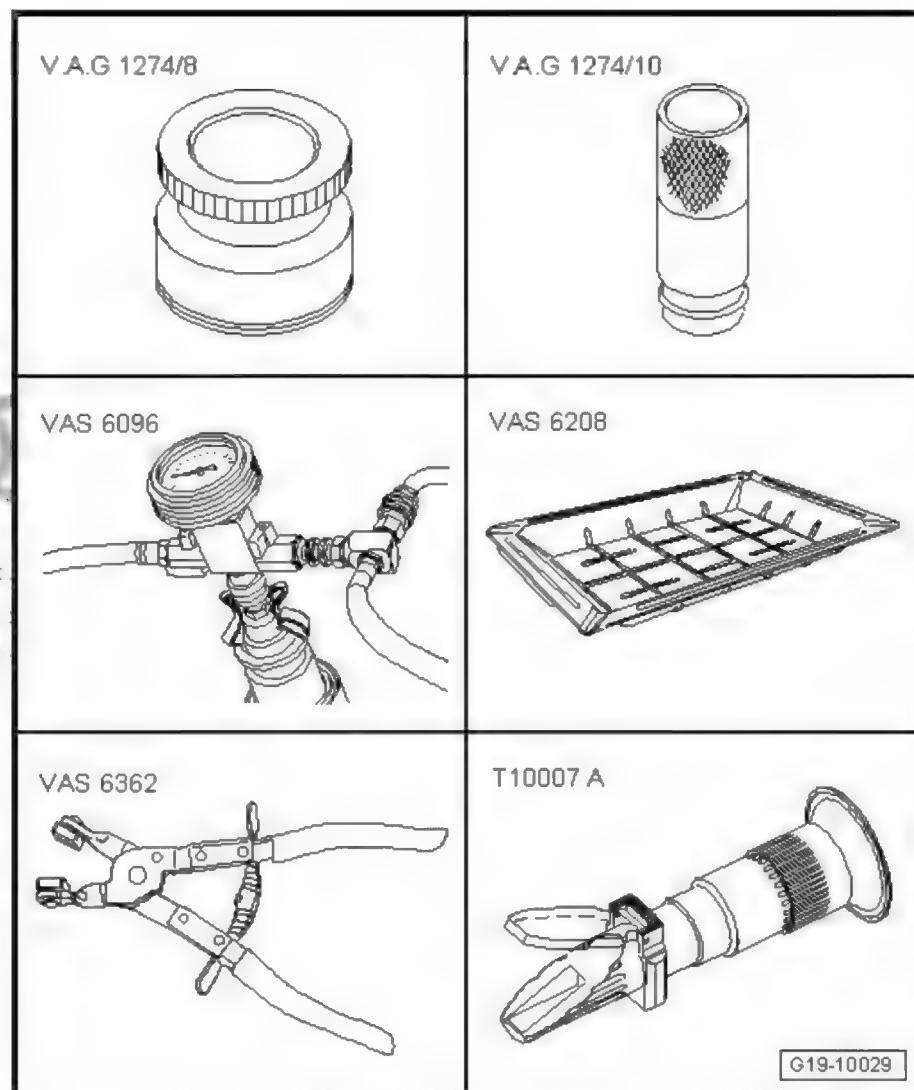


1.3 Draining and filling cooling system



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Special tools and workshop equipment required



- ◆ Adapter for cooling system tester - V.A.G 1274/8-
- ◆ Pipe for cooling system tester - V.A.G 1274/10-
- ◆ Cooling system charge unit - VAS 6096-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Hose clip pliers - VAS 6362-
- ◆ Refractometer - T10007A-
- ◆ ⇒ Vehicle diagnostic tester

Draining



WARNING

Risk of injury as the radiator fans may start up automatically.

- ◆ *Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.*

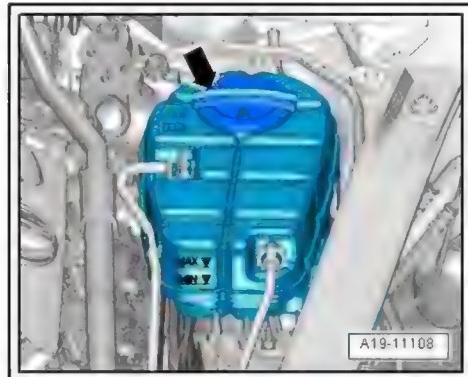


WARNING

*The cooling system is under pressure when the engine is hot.
 Risk of scalding due to hot steam and hot coolant.*

Danger of scalding skin and other parts of the body.

- *Put on protective gloves.*
- *Put on safety goggles.*
- *Cover filler cap on expansion tank with a cloth and open carefully to release pressure.*



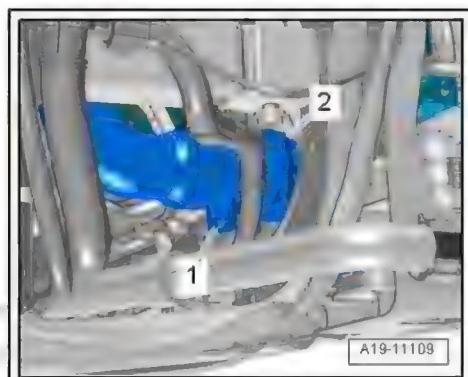
A19-11108

- Open filler cap -arrow- on coolant expansion tank.
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Remove drain plug -1- and drain off coolant.



Note

Disregard -item 2-.



A19-11109

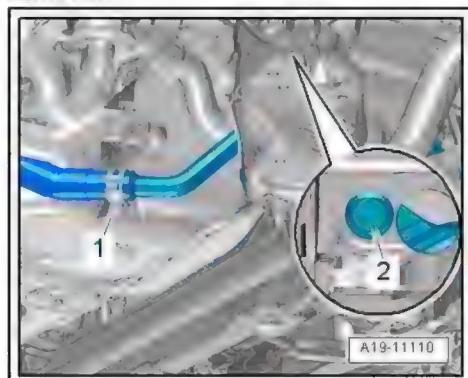
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- Release hose clip -1-, disconnect coolant hose from coolant pipe (bottom left) and drain off coolant.



Note

Disregard -item 2-.



A19-11110

- Release hose clips -1 and 3-, disconnect coolant hoses from coolant pipes (front left) and drain off remaining coolant.

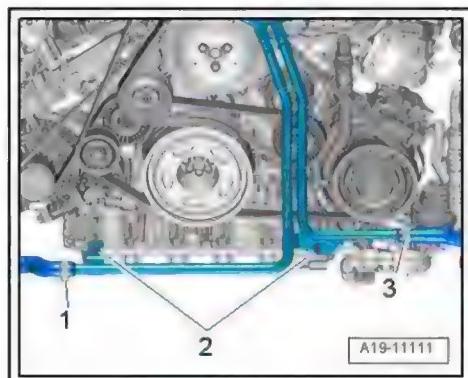


Note

- ◆ *For illustration purposes, the installation position is shown with the engine removed.*
- ◆ *Disregard -item 2-.*

Filling

- Ignition switched off.



A19-11111



Caution

To ensure optimal corrosion protection, only distilled water may be mixed with coolant additives.

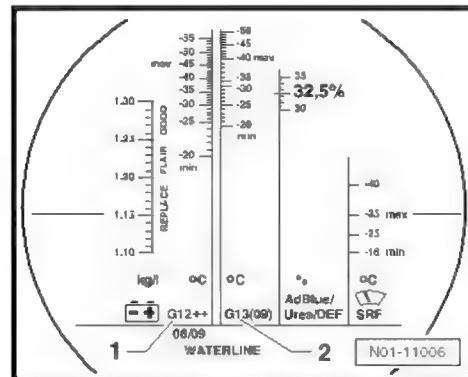


Note

- ◆ The effectiveness of the coolant is greatly influenced by the quality of the water with which it is mixed. Because water may contain different substances depending on the country or even the region, the water quality to be used for cooling systems has been specified. Distilled water meets all the requirements and is therefore recommended for use when topping up or filling up with coolant.
- ◆ Use only coolant additives listed in the ⇒ Electronic parts catalogue (ETKA). If you use other coolant additives, this can significantly impair in particular the corrosion protection effect. The resulting damage could lead to loss of coolant and consequently to serious engine damage.
- ◆ Coolant with the recommended mixture ratio prevents frost and corrosion damage and stops scaling. At the same time it raises the boiling point of the fluid in the system. For this reason the cooling system must be filled all year round with the correct coolant additive.
- ◆ Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.
- ◆ The refractometer - T10007A- MUST be used to determine the current level of frost protection.
- ◆ The mixture must guarantee frost protection down to at least -25 °C (in countries with arctic climate: down to -36 °C). The amount of antifreeze should only be increased if greater frost protection is required in very cold climates. This must only be down to -48 °C, however, as otherwise the cooling efficiency of the coolant is impaired.
- ◆ The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. Frost protection must be provided to at least -25 °C.
- ◆ Read off the level of frost protection on the scale for the relevant coolant additive.
- ◆ The temperature indicated on the refractometer - T10007A- corresponds to the temperature at which the first ice crystals can form in the coolant.
- ◆ Do not reuse coolant.
- ◆ Only use water/coolant additive as a lubricant for coolant hoses.

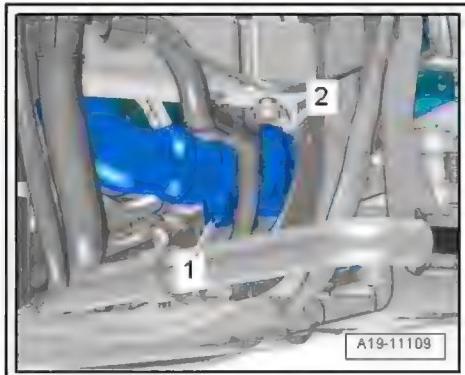
Recommended mixture ratio for coolant

- Coolant (40 %) and water (60 %) for frost protection to -25 °C
- Coolant (50 %) and water (50 %) for frost protection to -36 °C
- Coolant ⇒ Electronic parts catalogue



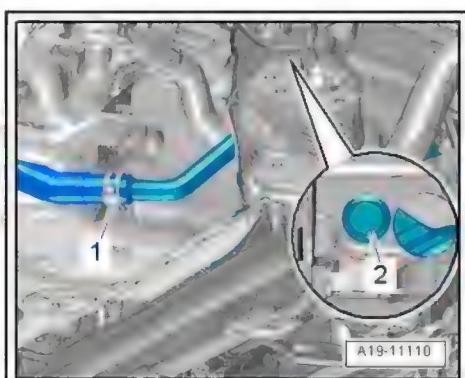
Procedure

- Close drain plug -1-.



- Connect coolant hose to coolant pipe (bottom left) with hose clip -1-.

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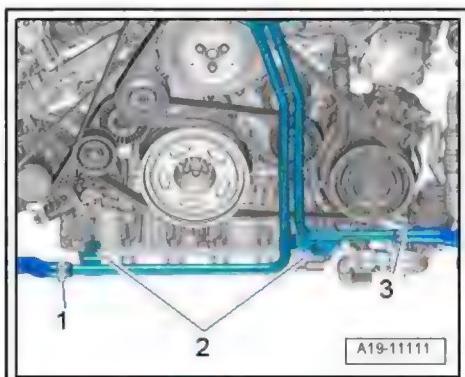


- Connect coolant hoses to coolant pipes (front left) with hose clips -1 and 3-.



Note

For illustration purposes, the installation position is shown with the engine removed.



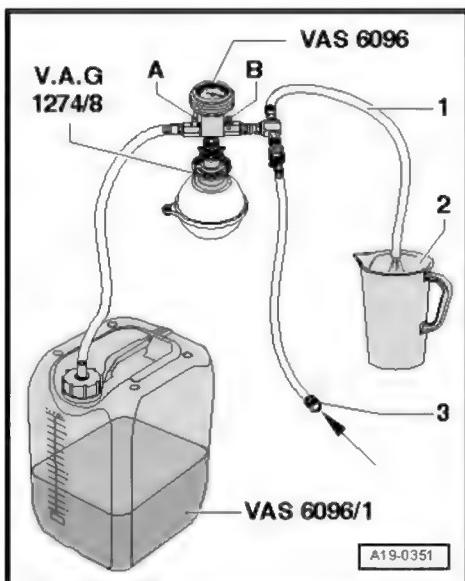
- Fill reservoir of cooling system charge unit - VAS 6096- with 12 litres of premixed coolant (according to recommended ratio [⇒ page 208](#)).
- Fit adapter for cooling system tester - V.A.G 1274/8- onto coolant expansion tank.
- Attach cooling system charge unit - VAS 6096- to adapter - V.A.G 1274/8-.
- Run vent hose -1- into a small container -2-.



Note

The vented air draws along a small amount of coolant, which should be collected.

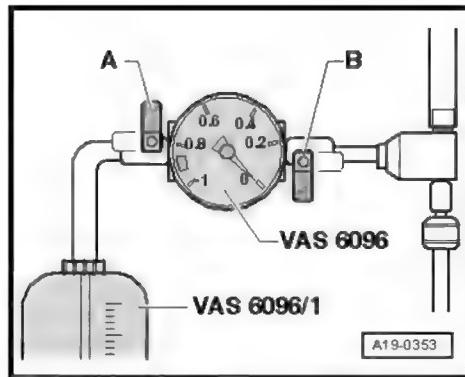
- Close both valves -A- and -B- (turn lever at right angles to direction of flow).
- Connect hose -3- to compressed air supply.
- Pressure: 7 ... 10 bar.



- Connect ⇒ Vehicle diagnostic tester to vehicle.
- Select following menu options on ⇒ Vehicle diagnostic tester:
 - ◆ Guided Functions mode
 - ◆ 01 – Simos fuel injection and ignition system
 - ◆ Functions – engine
 - ◆ 01 – Coolant circuit vent routine
- Follow instructions shown on vehicle diagnostic tester .
- Open valve -B- by setting lever in direction of flow.
- The suction jet pump generates a vacuum in the cooling system. The needle on the gauge should move into the green zone.
- Also briefly open valve -A- (turn lever in direction of flow) so that hose on reservoir of -VAS 6096- can fill with coolant.
- Close valve -A- again.
- Leave valve -B- open for another 2 minutes.
- The suction jet pump will continue generating a vacuum in the cooling system. The needle on the gauge should remain in the green zone.
- Close valve -B-.
- The needle on the gauge should stop in the green zone. The vacuum level in the cooling system is then sufficient for subsequent filling.

 Note

- ◆ If the needle does not reach the green zone, repeat the process.
 - ◆ Check cooling system for leaks if the vacuum is not maintained.
- 
- Detach compressed air hose.
 - Open valve -A-.
 - The vacuum in the cooling system causes the coolant to be drawn out of the reservoir of the cooling system charge unit - VAS 6096- ; the cooling system is then filled.
 - Detach cooling system charge unit - VAS 6096- from adapter -V.A.G 1274/8- on coolant expansion tank.



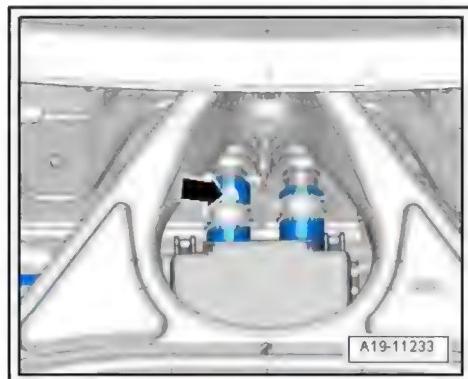
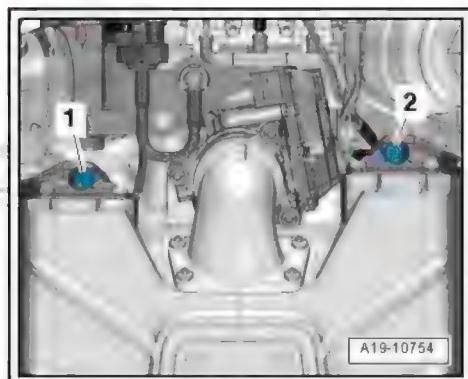
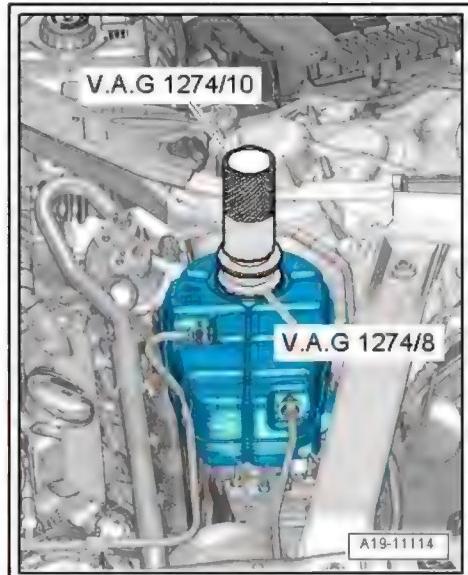
- Attach pipe -V.A.G 1274/10- onto adapter -V.A.G 1274/8- .
- Fill up with coolant until pipe for cooling system tester is filled. If required, add further coolant when performing bleeding procedure.
- Remove engine cover panel (rear) ⇒ [page 67](#) .



Note

Place a cloth underneath to catch escaping coolant.

- Open bleeder screws -1- and -2- one after the other until coolant flows out.
- Close bleeder screws.
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .
- Release coolant hose going to heat exchanger and pull back hose until coolant flows out at bleeder hole -arrow- in coolant hose.
- Push coolant hose back onto connection and secure with hose clip.
- On vehicles with auxiliary heater, switch heater on (for about 30 seconds) and then off again.
- Close filler cap -arrow- on coolant expansion tank (make sure it engages).
- Start engine.
- Set temperature to "HI" for all zones and select lowest blower speed (= 0).
- Switch off air conditioner compressor (press **AC** button).
 - LED in button should not light up.
- Run engine for 3 minutes at 2000 rpm.
- Allow engine to run at idling speed until both large coolant hoses at radiator become warm.
- Run engine for 2 minutes at 2000 rpm.



- Switch off ignition and allow engine to cool down.
- Install noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Check coolant level.
 - The coolant level must be at the MAX marking when the engine is cold.
 - The coolant level can be above the MAX marking when the engine is warm.



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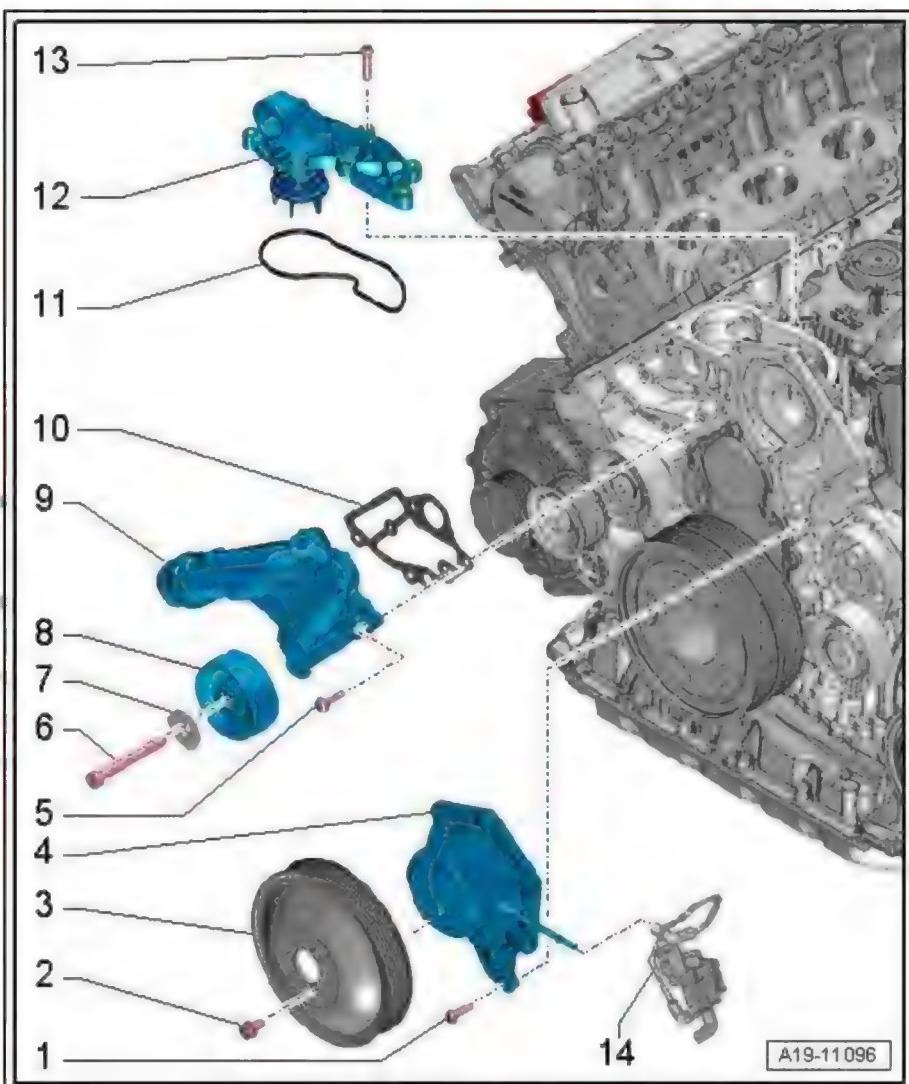


2 Coolant pump/thermostat assembly

- ⇒ "2.1 Exploded view - coolant pump/thermostat", page 213
- ⇒ "2.2 Removing and installing electric coolant pump", page 214
- ⇒ "2.3 Removing and installing coolant pump", page 215
- ⇒ "2.4 Removing and installing thermostat", page 217
- ⇒ "2.5 Removing and installing coolant temperature sender G62", page 217
- ⇒ "2.6 Removing and installing temperature sender for engine temperature regulation G694", page 218
- ⇒ "2.7 Removing and installing coolant valves", page 219

2.1 Exploded view - coolant pump/thermostat

- 1 - Bolt
 - 9 Nm
- 2 - Bolt
 - 20 Nm
- 3 - Poly V-belt pulley
 - For coolant pump
- 4 - Coolant pump
 - With seal
 - Removing and installing
⇒ "2.3 Removing and installing coolant pump", page 215
- 5 - Bolt
 - 9 Nm
- 6 - Bolt
 - Tightening torque ⇒ Item 2 (page 69)
- 7 - Washer
- 8 - Idler roller
 - For poly V-belt
- 9 - Connection
 - For coolant hose
- 10 - Gasket
 - Renew
- 11 - Seal
- 12 - Thermostat
 - Removing and installing
⇒ "2.4 Removing and installing thermostat", page 217



A19-11096



Note

When removing and installing the thermostat, make sure that the nee...

idle is fitted correctly (conical end fitted in wax expansion element of thermostat). If necessary, push thermostat needle as far as possible into wax expansion element.

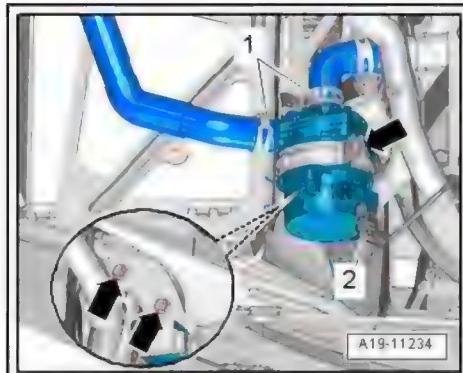
13 - Bolt

9 Nm

14 - Coolant valve for cylinder head - N489-

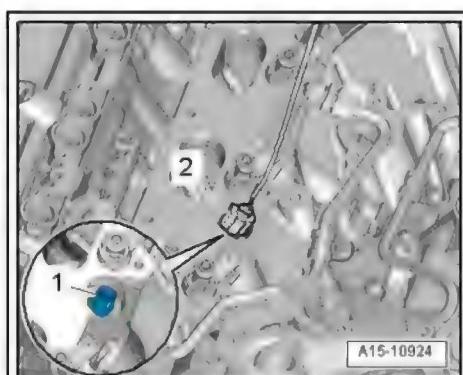
Charge air cooling pump - V188- - tightening torque

- Tighten nut -2- to 9 Nm.



Temperature sender for engine temperature regulation - G694- - tightening torque

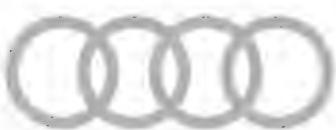
- Tighten temperature sender for engine temperature regulation - G694- - item 1- to 3 Nm.



2.2 Removing and installing electric coolant pump

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-

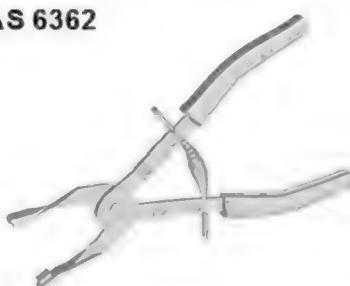


- ◆ Hose clip pliers - VAS 6362-



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VAS 6362



W00-11227

Removing

- Remove front left wheel spoiler ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .
- Unplug electrical connector -2-.
- Unscrew nuts -arrows- and remove bracket.
- Clamp off coolant hoses at charge air cooling pump - V188- using hose clamps, up to 25 mm - 3094- , release hose clips -1- and disconnect coolant hoses.

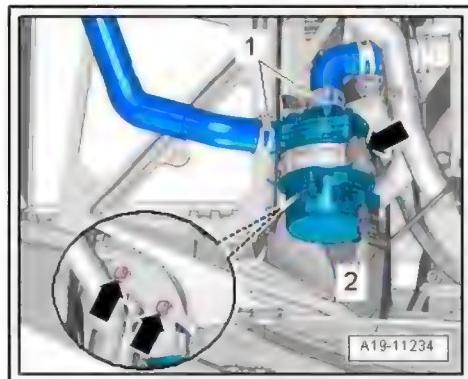
Installing

Installation is carried out in reverse order; note the following:



Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .



- Check coolant level [⇒ page 207](#) .

Tightening torques

- ◆ [⇒ Fig. ““ Charge air cooling pump -V188- - tightening torque”“](#), [page 214](#)
- ◆ Front wheel spoiler ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)

2.3 Removing and installing coolant pump

Special tools and workshop equipment required

- ◆ Pin wrench - 3212-

3212



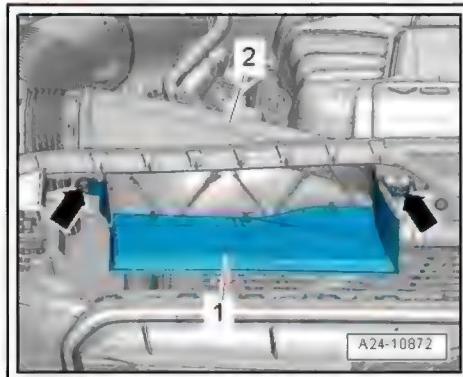
W00-0462

Removing

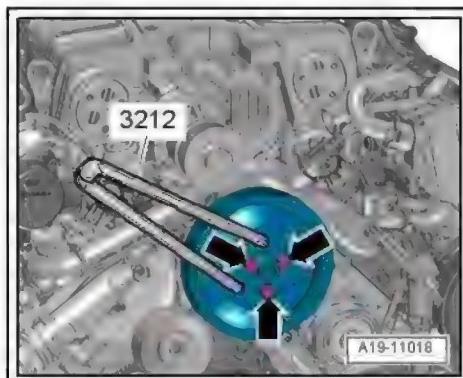
- Drain coolant [⇒ page 205](#).
- Remove poly V-belt for supercharger [⇒ page 71](#).
- Detach poly V-belt from air conditioner compressor, but do not remove completely [⇒ "1.2.2 Removing and installing poly V-belt for ancillaries", page 73](#).
- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments.
- Remove bolts -arrows- and detach air duct -1-.



Disregard -item 2-.



- Loosen bolts -arrows- for coolant pump pulley (counterhold with pin wrench - 3212-).
- Remove bolts and take off poly V-belt pulley.



- Disconnect vacuum hose -1-.



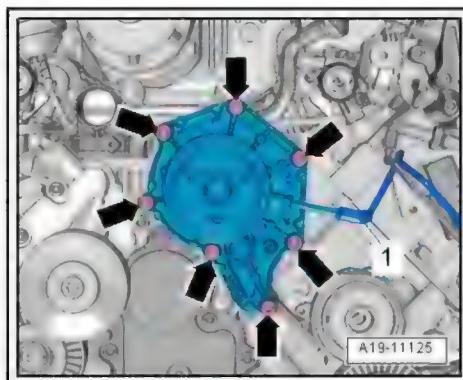
Place a cloth underneath to catch escaping coolant.

- Remove bolts -arrows- and detach coolant pump to the side.

Installing

Installation is carried out in reverse order; note the following:

- Clean surfaces; they must be free of oil and grease.
- Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments.
- Install poly V-belt [⇒ page 73](#).



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Do not reuse coolant.

- Fill up with coolant [⇒ page 207](#).

Tightening torques

- ◆ ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 213
- ◆ ⇒ “3.2 Removing and installing air cleaner housing”, page 295

2.4 Removing and installing thermostat

Removing

- Drain coolant ⇒ page 205 .
- Remove supercharger ⇒ page 259 .
- Remove coolant pipe (front) ⇒ page 229 .

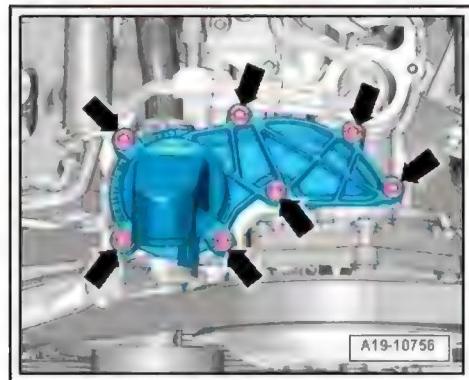


Place a cloth underneath to catch any escaping coolant.

- Remove bolts -arrows-.
- Detach coolant thermostat with hose connection.

Installing

Installation is carried out in reverse order; note the following:



When removing and installing the thermostat, make sure that the needle is fitted correctly (conical end fitted in wax expansion element of thermostat). If necessary, push thermostat needle as far as possible into wax expansion element.



Renew gasket.

- Install coolant pipe (front) ⇒ page 229 .
- Install supercharger ⇒ page 259 .



Do not reuse coolant.

- Fill up with coolant ⇒ page 207 .

Tightening torques

- ◆ ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 213

2.5 Removing and installing coolant temperature sender - G62-

Removing

- Engine cold.
- To relieve residual pressure in cooling system, open filler cap -arrow- on coolant expansion tank briefly and then close cap again (it should click into place).
- Remove engine cover panel (front) [⇒ page 67](#).



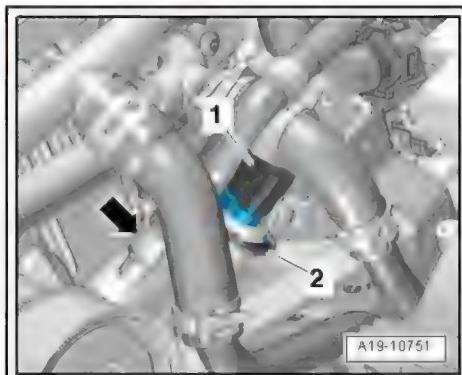
- Unplug electrical connector -1- at coolant temperature sender - G62- .



Note

Place a cloth underneath to catch escaping coolant.

- Pull off retaining clip -2- and detach coolant temperature sender - G62- .



Note

Disregard -arrow-.

Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ Fit new O-ring.
- ◆ Insert new coolant temperature sender - G62- immediately into connection to avoid loss of coolant.
- Check coolant level [⇒ page 212](#).

2.6 Removing and installing temperature sender for engine temperature regulation - G694-

Removing

- Remove intake manifold (bottom section, right-side) [⇒ page 300](#).

- Unplug electrical connector -2-.
- Unscrew temperature sender for engine temperature regulation - G694- -item 1-

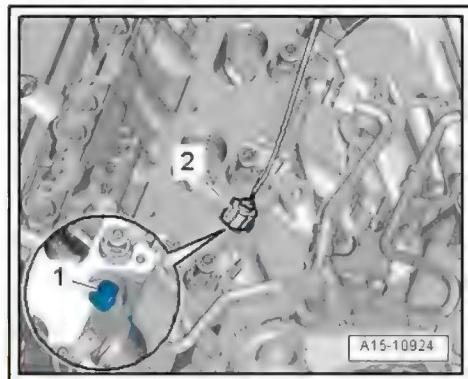
Installing

Installation is carried out in reverse order; note the following:

- Install intake manifold (bottom section, right-side) [⇒ page 300](#)

Tightening torques

- ◆ [⇒ Fig. “Temperature sender for engine temperature regulation -G694- - tightening torque”](#), page 214



2.7 Removing and installing coolant valves

Special tools and workshop equipment required

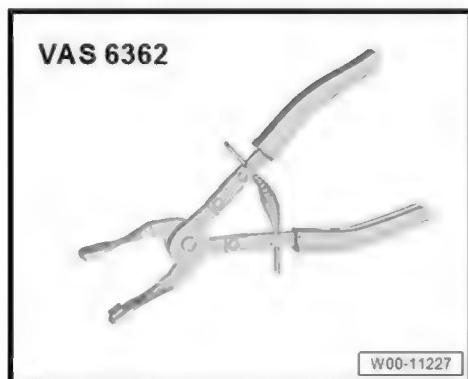
- ◆ Hose clamps, up to 25 mm - 3094-



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- ◆ Hose clip pliers - VAS 6362-



Removing

- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

- Remove bolts -arrows- and detach heat shield -3-.
- Unplug electrical connector -1-.
- Clamp off coolant hoses using hose clamps up to 25 mm - 3094-, release hose clips -2- and disconnect hoses.
- Detach gearbox oil cooling valve - N509- .

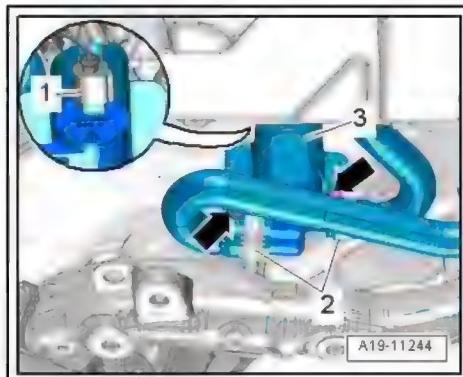
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .
 - ◆ Do not reuse coolant.
- Fill up with coolant ⇒ [page 207](#) .
- Tightening torques
- ◆ ⇒ [“3.1 Exploded view - coolant pipes”, page 221](#)
 - ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation



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3 Coolant pipes

⇒ "3.1 Exploded view - coolant pipes", page 221

⇒ "3.2 Fitting coolant hoses", page 224

⇒ "3.3 Removing and installing coolant pipes", page 224

3.1 Exploded view - coolant pipes

Coolant pipes on engine

1 - Bolt
 9 Nm

2 - Bolt
 9 Nm

3 - Coolant pipes (front left)
 Removing and installing
 ⇒ "3.3.3 Removing and installing coolant pipes (front left)", page 228

4 - Retainer

5 - Bolt
 22 Nm

6 - Bolt
 2.5 Nm

7 - Bolt
 9 Nm

8 - Coolant pipe (front)
 Removing and installing
 ⇒ "3.3.4 Removing and installing coolant pipe (front)", page 229

9 - Seal
 Renew

10 - O-rings
 Renew

11 - Coolant temperature sender - G62-
 with respect to the cooling system
 Removing and installing
 ⇒ "2.5 Removing and installing coolant temperature sender G62", page 217

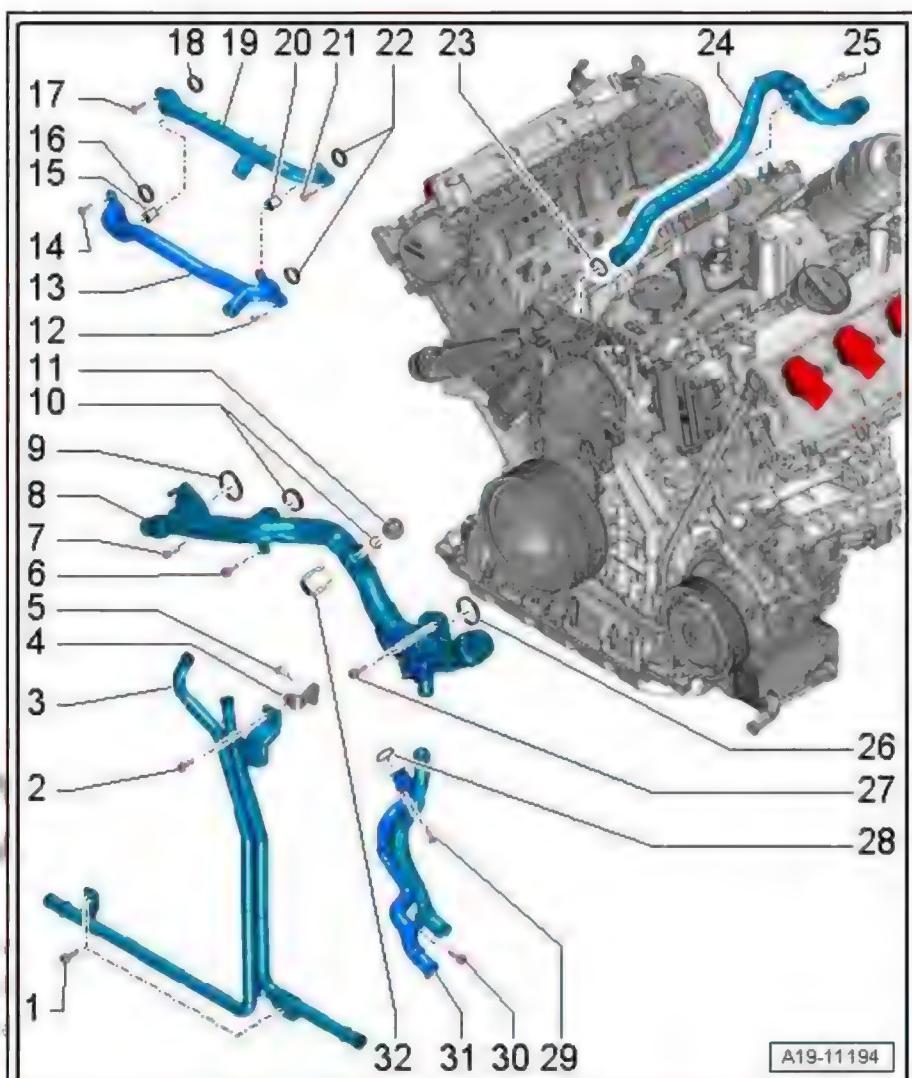
12 - Bolt
 5 Nm

13 - Coolant pipe (bottom) on supercharger
 Remove and install together with -item 20- ⇒ page 234

14 - Bolt
 5 Nm

15 - Dowel sleeve

16 - Seal



A19-11194

Renew

17 - Bolt

5 Nm

18 - Seal

Renew

19 - Coolant pipe (top) on supercharger

Remove and install together with -item 14- ⇒ [“3.3.6 Removing and installing coolant pipes on supercharger”, page 234](#)

20 - Dowel sleeve

21 - Bolt

5 Nm

22 - Seals

Renew

23 - O-ring

Renew

24 - Coolant pipe (top)

Removing and installing ⇒ [“3.3.5 Removing and installing coolant pipe \(top\)”, page 232](#)

25 - Bolt

9 Nm

26 - Seal

Renew

27 - Bolt

9 Nm

28 - O-ring

Renew

29 - Bolt

Renew

3 Nm +90°

30 - Bolt

Renew

3 Nm +90°

31 - Coolant pipes (left-side)

Removing and installing ⇒ [“3.3.1 Removing and installing coolant pipes \(left-side\)”, page 225](#)

32 - Retaining clip

Coolant pipes to 7-speed dual clutch gearbox 0B5



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1 - Bolt

- 22 Nm

2 - Coolant pipe (bottom left)

- Removing and installing
 ⇒ "3.3.2 Removing and installing coolant pipe (bottom left)", page 226

3 - Gearbox oil cooling valve - N509-

- Removing and installing
 ⇒ "2.7 Removing and installing coolant valves", page 219

4 - Bolt

- 9 Nm

5 - Heat shield

6 - Bolt

- 9 Nm

7 - Coolant pipe (right-side) on gearbox

- Removing and installing
 ⇒ "3.3.7 Removing and installing coolant pipe (right-side) on gearbox", page 235

8 - Bolt

- 9 Nm

9 - Bracket

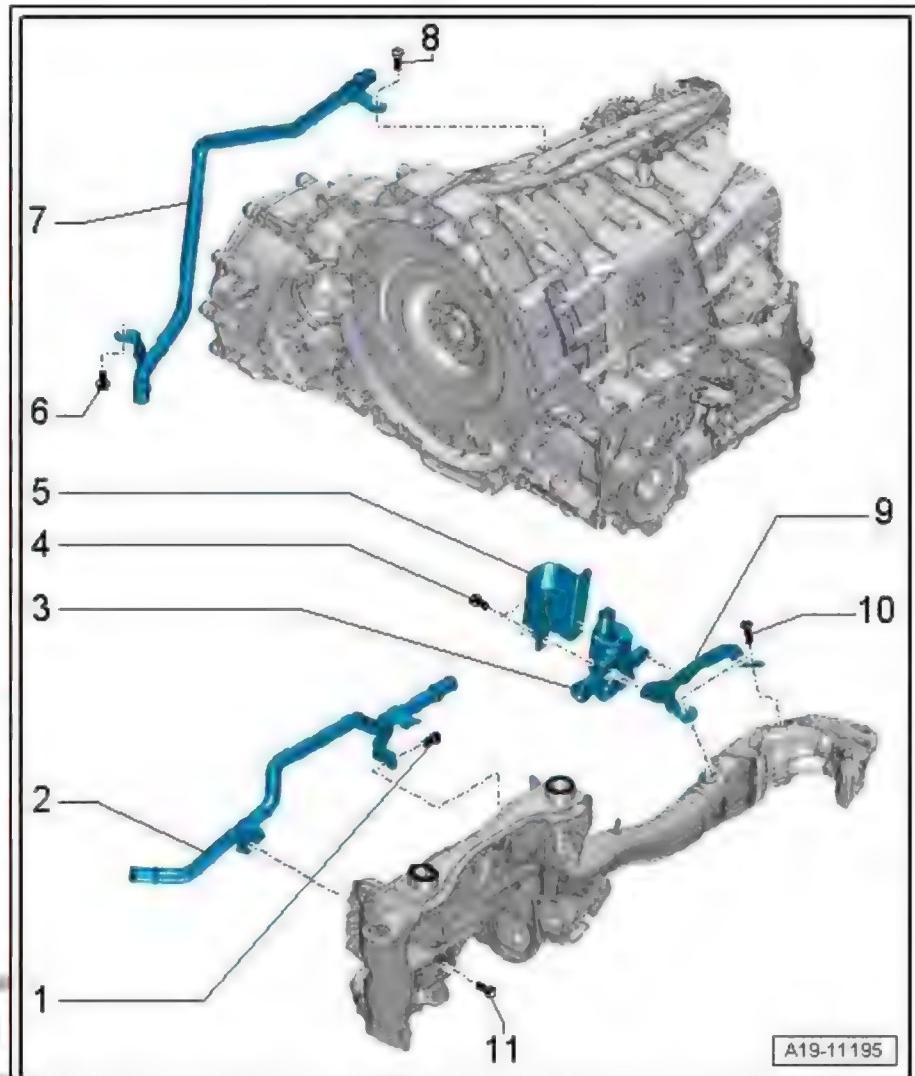
- For gearbox oil cooling valve - N509-

10 - Bolt

- 9 Nm

11 - Bolt

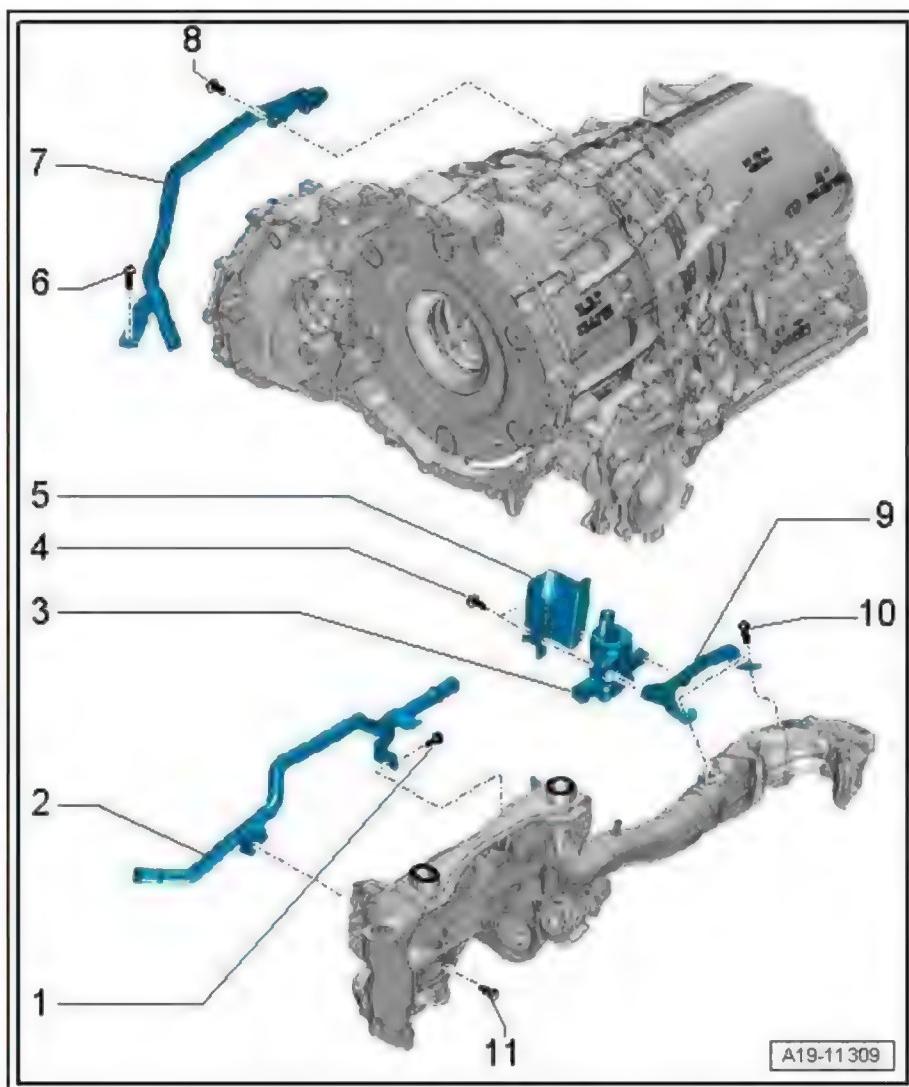
- 22 Nm



A19-11195

Coolant pipes to 8-speed automatic gearbox 0BK

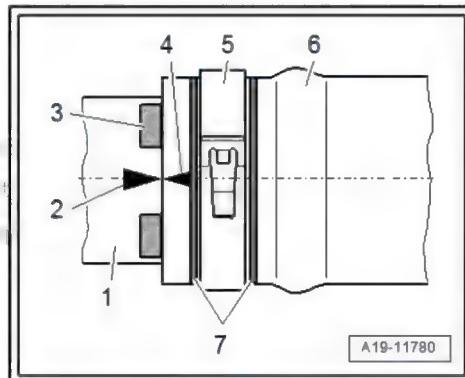
- 1 - Bolt
 - 22 Nm
- 2 - Coolant pipe (bottom left)
 - Removing and installing
 ⇒ "3.3.2 Removing and installing coolant pipe (bottom left)", page 226
- 3 - Gearbox oil cooling valve - N509-
 - Removing and installing
 ⇒ "2.7 Removing and installing coolant valves", page 219
- 4 - Bolt
 - 9 Nm
- 5 - Heat shield
- 6 - Bolt
 - 9 Nm
- 7 - Coolant pipe (right-side) on gearbox
 - Removing and installing
 ⇒ "3.3.7 Removing and installing coolant pipe (right-side) on gearbox", page 235
- 8 - Bolt
 - 9 Nm
- 9 - Bracket
 - For gearbox oil cooling valve - N509-
- 10 - Bolt
 - 9 Nm
- 11 - Bolt
 - 22 Nm



A19-11309

3.2 Fitting coolant hoses

- Fit coolant hose on connection as follows:
- Push coolant hose -6- onto connection -1- as far as stop -3-.
- If stop is not fitted, push coolant hose 28 mm onto connection.
- Arrow marking -4- on coolant hose must align with arrow marking -2- on connection. Some parts have line markings instead of arrows.
- Use only undamaged hose clips -5- (same as original equipment).
- Position hose clips between coloured markings -7-.
- Position lugs of hose clips for maximum clearance from surrounding parts.



A19-11780

3.3 Removing and installing coolant pipes

- ⇒ "3.3.1 Removing and installing coolant pipes (left-side)",
[page 225](#)
- ⇒ "3.3.2 Removing and installing coolant pipe (bottom left)", [page 226](#)
- ⇒ "3.3.3 Removing and installing coolant pipes (front left)",
[page 228](#)
- ⇒ "3.3.4 Removing and installing coolant pipe (front)", [page 229](#)
- ⇒ "3.3.5 Removing and installing coolant pipe (top)", [page 232](#)
- ⇒ "3.3.6 Removing and installing coolant pipes on supercharger",
[page 234](#)
- ⇒ "3.3.7 Removing and installing coolant pipe (right-side) on
gearbox", [page 235](#)

3.3.1 Removing and installing coolant pipes (left-side)

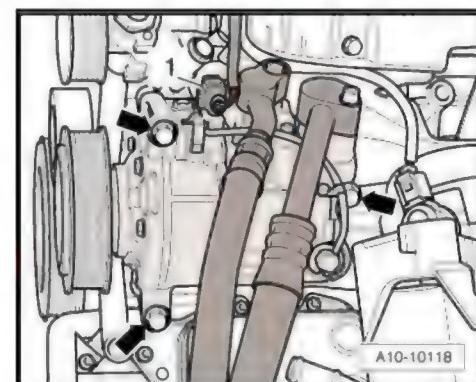
Special tools and workshop equipment required

- ◆ Hose clip pliers - VAS 6362-

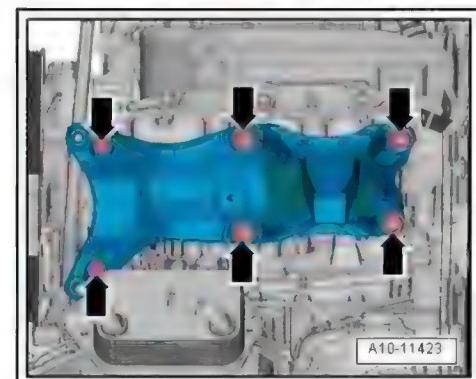


Removing

- Drain coolant ⇒ [page 205](#) .
- Detach poly V-belt from air conditioner compressor ⇒ "1.2.2 Removing and installing poly V-belt for ancillaries", [page 73](#) .
- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .
- Remove engine mounting (left-side) ⇒ [page 61](#) .



- Remove bolts -arrows- and detach engine support with bracket for air conditioner compressor.



- Remove bolts -arrows-.
- Release hose clips -1- and -2- and disconnect coolant pipes from coolant hoses.

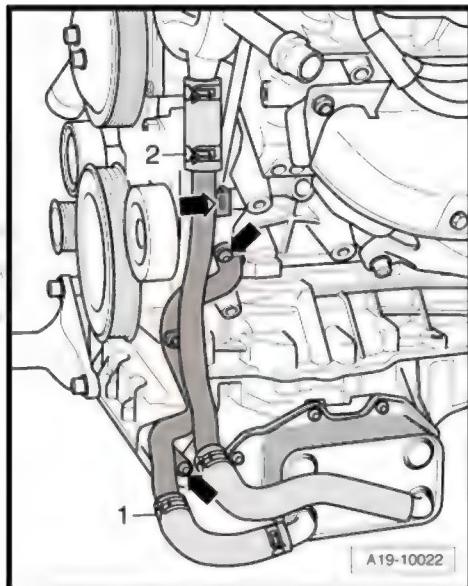
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ *Fit new O-ring.*
- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Clean and smoothen sealing surface for O-ring.
- Lubricate O-ring with coolant and slide onto coolant pipe.
- Install engine support with bracket for air conditioner compressor and engine mounting (left-side) ⇒ [page 58](#) .
- Install poly V-belt ⇒ [page 73](#) .



Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 207](#) .

Tightening torques

- ◆ ⇒ “[3.1 Exploded view - coolant pipes](#)”, [page 221](#)
- ◆ ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit

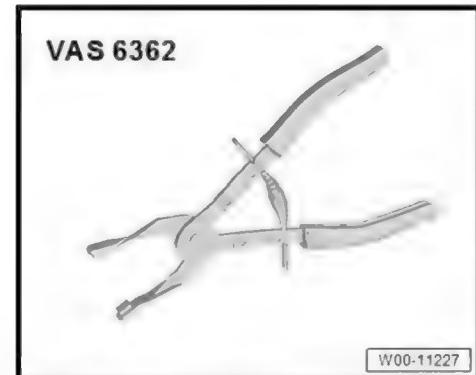
3.3.2 Removing and installing coolant pipe (bottom left)

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Hose clip pliers - VAS 6362-



- ◆ Drip tray for workshop hoist - VAS 6208-



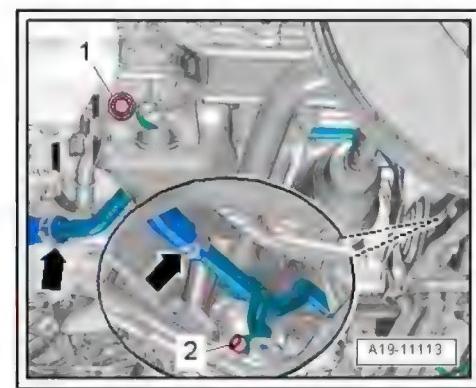
Removing

- Remove engine mounting (left-side) [⇒ page 61](#).



Place a cloth under coolant pipe to catch escaping coolant.

- Clamp off coolant hoses using hose clamps up to 25 mm - 3094-, release hose clips -arrows- and disconnect coolant hoses from coolant pipe (bottom left).
- Detach coolant pipe (bottom left).



Disregard items -1 and 2-.

Installing

Installation is carried out in reverse order; note the following:



Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#).

- Install engine mounting (left-side) [⇒ page 61](#).



Do not reuse coolant.

- Fill up with coolant \Rightarrow page 207 .

Tightening torques

- ◆ ⇒ "3.1 Exploded view - coolant pipes", page 221

3.3.3 Removing and installing coolant pipes (front left)

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Drip tray for workshop hoist - VAS 6208-



- #### ◆ Hose clip pliers VAS 6362-



Removing

- Remove engine cover panel (front) ⇒ [page 67](#) .
 - Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .



WARNING

*The cooling system is under pressure when the engine is hot.
 Risk of scalding due to hot steam and hot coolant.*

Danger of scalding skin and other parts of the body.

- Put on protective gloves.
- Put on safety goggles.
- Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



A19-11108

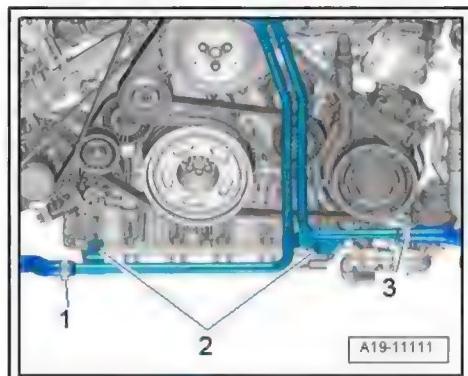
- Open filler cap -arrow- on coolant expansion tank.
- Place drip tray for workshop hoist - VAS 6208- beneath engine.



Note

For illustration purposes, the installation position is shown with the bumper removed in this and the following illustration.

- Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -1- and -3- and disconnect coolant hoses from coolant pipes (front left).
- Remove bolts -2-.
- Release hose clips -1- and detach coolant hoses from coolant pipes at supercharger.
- Remove bolt -2-.
- Detach coolant pipes (front left) from below.



A19-11111

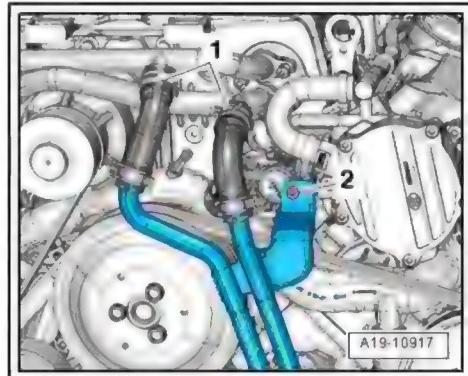
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .
- ◆ Do not reuse coolant.



A19-10917

- Fill up with coolant ⇒ [page 207](#) .

Tightening torques

- ◆ ⇒ [“3.1 Exploded view - coolant pipes”, page 221](#)
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

3.3.4 Removing and installing coolant pipe (front)

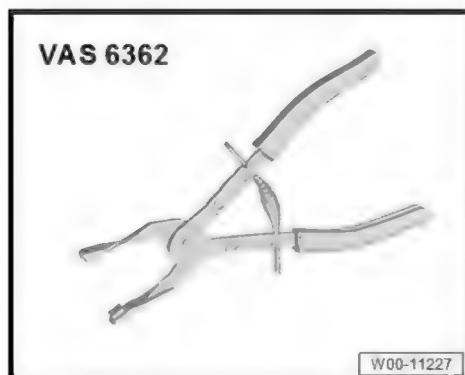
Special tools and workshop equipment required

◆ Pin wrench - 3212-



W00-0462

◆ Hose clip pliers - VAS 6362-



W00-11227

Removing

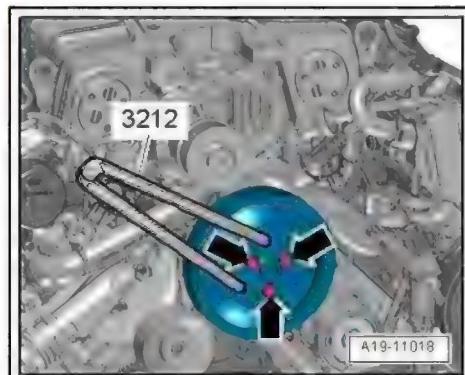
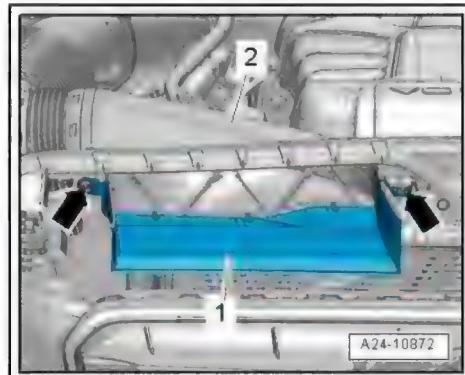
- Drain coolant [page 205](#).
- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Remove bolts -arrows- and detach air duct -1-.



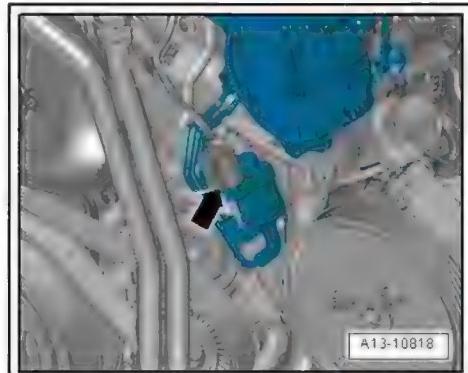
Note

Disregard -item 2-.

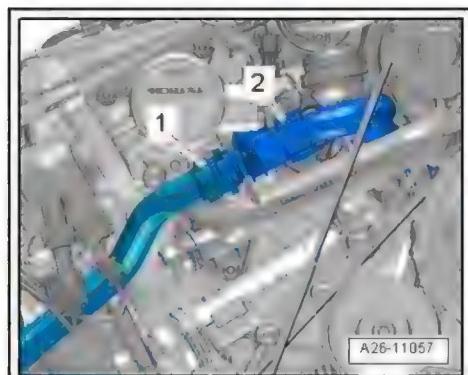
- Remove coolant pipes (front left) [page 228](#).
- Detach poly V-belt from air conditioner compressor ["1.2.2 Removing and installing poly V-belt for ancillaries", page 73](#).
- Loosen bolts -arrows- for coolant pump pulley (counterhold with pin wrench - 3212-).
- Remove bolts and take off poly V-belt pulley.



- Detach coolant valve for cylinder head - N489- -arrow- from bracket and move it clear to the side.



- Press release tabs and move clear -2- secondary air hose -1-, take it out of bracket towards front and disconnect it.



- Unplug electrical connector -3- at coolant temperature sender - G62- .
- Lift retaining clips and disconnect coolant hoses -1 and 4-.
- Release hose clip -2- and detach coolant hose (top).
- Release hose clip -5-.
- Unscrew bolts -arrows- and remove coolant pipe (front).

Installing

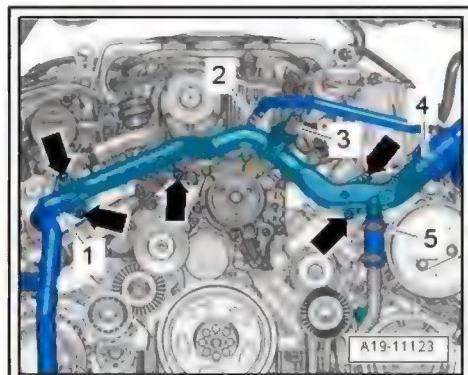
Installation is carried out in reverse order; note the following:



Note

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- ◆ ***Renew seals and O-rings.***
- ◆ ***Secure all hose connections with the correct type of hose clips (same as original equipment)*** ⇒ *Electronic parts catalogue*



- Clean or smoothen sealing surfaces for seals and O-rings.
- Lubricate seals and O-rings with coolant and slide onto coolant pipe.
- Connect coolant hose with plug-in connector [⇒ page 240](#) .
- Install poly V-belt [⇒ page 73](#) .
- Install coolant pipes (front left) [⇒ page 228](#) .
- Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .



Note

Do not reuse coolant.

- Fill up with coolant [⇒ page 207](#).

Tightening torques

- ◆ [⇒ "3.1 Exploded view - coolant pipes", page 221](#)
- ◆ [⇒ "2.1 Exploded view - coolant pump/thermostat", page 213](#)
- ◆ Air pipe [⇒ "3.1 Exploded view - air cleaner housing", page 295](#)

3.3.5 Removing and installing coolant pipe (top)

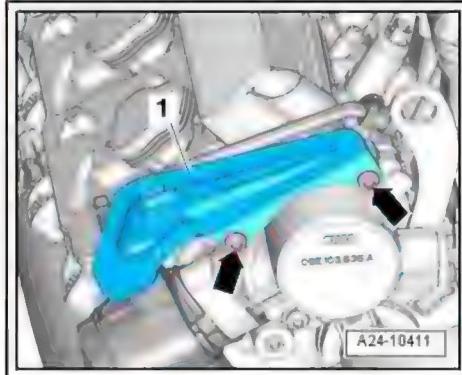
Removing



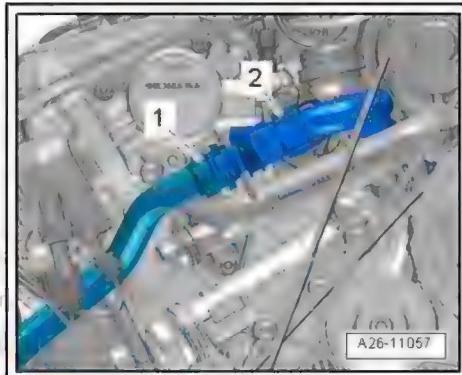
Note

Fit all cable ties in the original positions when installing.

- Drain coolant [⇒ page 205](#).
- Remove intake manifold (bottom section, right-side) [⇒ page 300](#).
- Remove nuts -arrows- and detach guard plate -1- for high-pressure pipe.



- Press release tabs and move clear -2- secondary air hose -1-, take it out of bracket towards front and disconnect it.



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- Unscrew connection -1-.

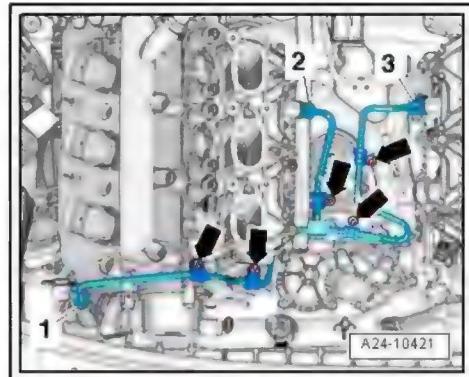


WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap a clean cloth around connection and open connection carefully).



- Unscrew union nuts -2- and -3- (counterhold connection).
- Unscrew bolts -arrows- on retaining clips and detach high-pressure pipe.



Note

The threaded connection on the fuel rail must be renewed if it has been loosened or removed at union nuts -2- and -3-.



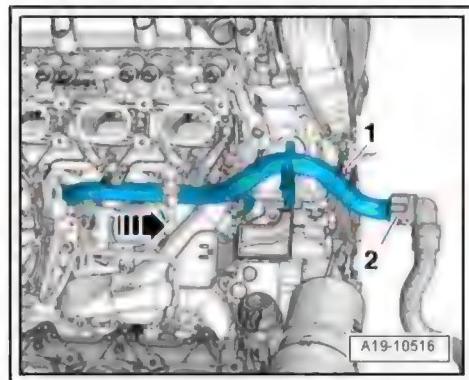
Note

Place a cloth under coolant pipe to catch escaping coolant.

- Lift retaining clip -2- and disconnect coolant hose from coolant pipe.
- Remove bolt -1- and pull coolant pipe rearwards out of cylinder block -arrow-.

Installing

Installation is carried out in reverse order; note the following:



Note

Fit new O-rings.

- Clean and smoothen sealing surface for O-ring.
- Lubricate O-ring with coolant and slide onto coolant pipe.
- Connect coolant hose with plug-in connector [⇒ page 240](#).
- Install high-pressure pipe [⇒ page 315](#).
- Install intake manifold (bottom section) [⇒ page 300](#).



Note

Do not reuse coolant.

- Fill up with coolant [⇒ page 207](#).

Tightening torques

- ◆ [⇒ "3.1 Exploded view - coolant pipes", page 221](#)

3.3.6 Removing and installing coolant pipes on supercharger

Special tools and workshop equipment required

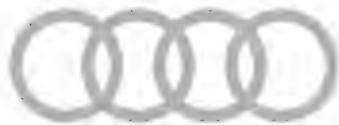
- ◆ Hose clamps, up to 25 mm - 3094-



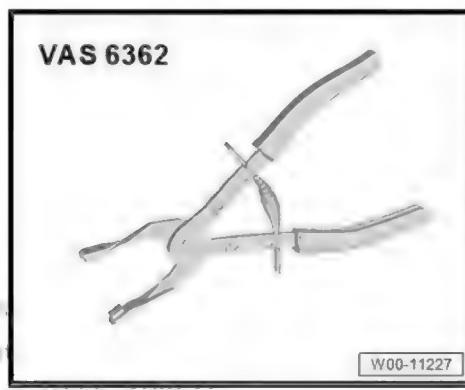
- ◆ Drip tray for workshop hoist - VAS 6208-



- ◆ Hose clip pliers - VAS 6362-



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Removing

- Remove engine cover panel (front) ⇒ [page 67](#).
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

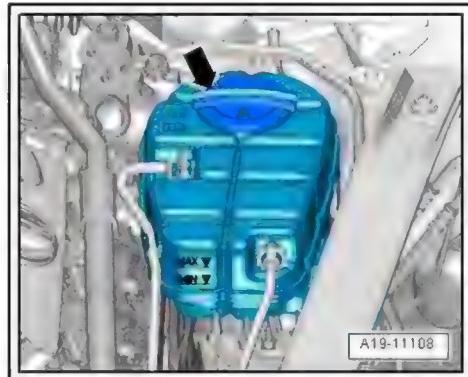


WARNING

*The cooling system is under pressure when the engine is hot.
 Risk of scalding due to hot steam and hot coolant.*

Danger of scalding skin and other parts of the body.

- *Put on protective gloves.*
- *Put on safety goggles.*
- *Cover filler cap on expansion tank with a cloth and open carefully to release pressure.*



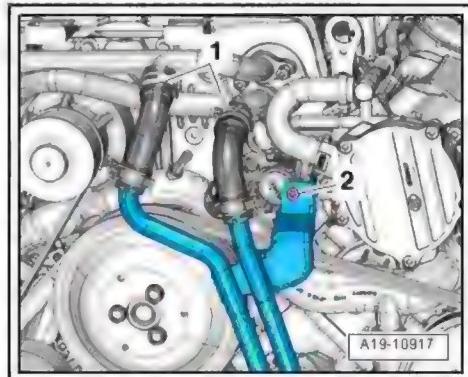
A19-11108

- Open filler cap -arrow- on coolant expansion tank.
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Clamp off coolant hoses using hose clamps, up to 25 mm - 3094-, release hose clips -1- and disconnect coolant hoses from coolant pipes at supercharger.



Note

Disregard -item 2-.



A19-10917

- Remove bolts -1- and -2- and take off coolant pipes.

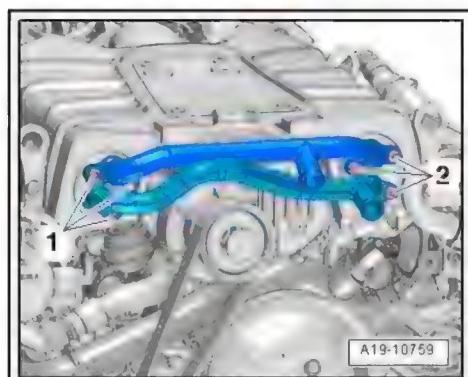
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ *Renew seals and/or gaskets.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *Do not reuse coolant.*



A19-10759

- Fill up with coolant ⇒ [page 207](#) .

Tightening torques

- ◆ ⇒ [“3.1 Exploded view - coolant pipes”, page 221](#)
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

3.3.7 Removing and installing coolant pipe (right-side) on gearbox

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



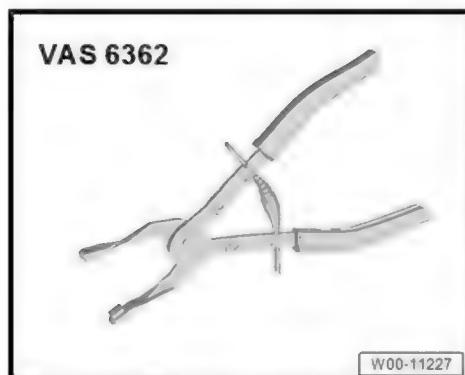
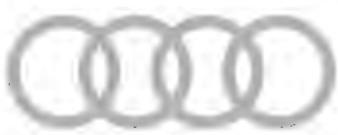
W00-11130

- ◆ Drip tray for workshop hoist - VAS 6208-



W00-11209

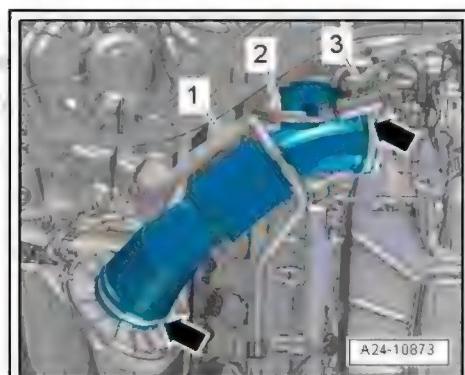
- ◆ Hose clip pliers - VAS 6362-



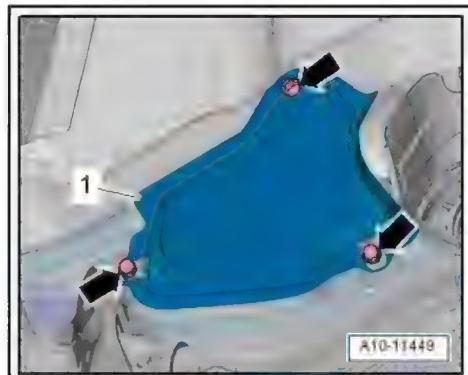
W00-11227

Removing

- Remove engine cover panel (rear) [⇒ page 67](#).
- Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe with respect to the correctness of information in this
- Detach vacuum hose -3- from connection on air pipe.
- Loosen hose clips -arrows- and detach air pipe.



- Remove bolts -arrows- and detach heat shield (right-side)
 -1- on subframe.

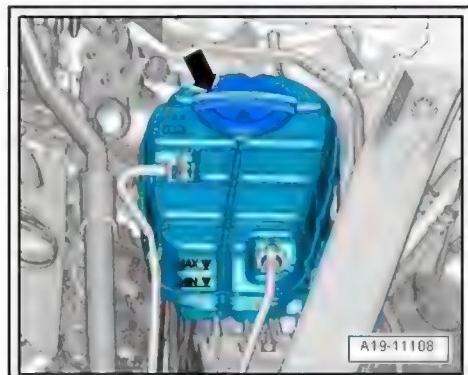


WARNING

*The cooling system is under pressure when the engine is hot.
 Risk of scalding due to hot steam and hot coolant.*

Danger of scalding skin and other parts of the body.

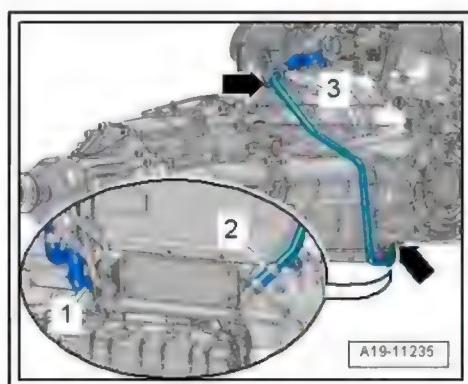
- Put on protective gloves.
- Put on safety goggles.
- Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



- Open filler cap -arrow- on coolant expansion tank.
- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Place drip tray for workshop hoist - VAS 6208- under connection.

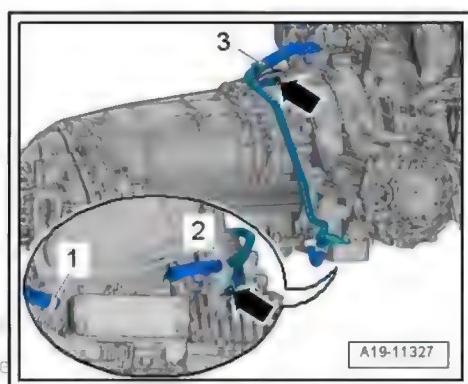
Vehicles with 7-speed dual clutch gearbox 0B5:

- Clamp off coolant hose -1- with hose clamp, up to 25 mm - 3094- .
- Remove bolts -arrows-.
- Clamp off coolant hose -3- using hose clamp up to 25 mm - 3094- , release hose clip and disconnect coolant hose from coolant pipe on right side of gearbox.
- Release hose clip -2- and detach coolant pipe going to wheel housing (right-side).



Vehicles with 8-speed automatic gearbox 0BK:

- Clamp off coolant hose -1- with hose clamp, up to 25 mm - 3094- .
- Remove bolts -arrows-.
- Clamp off coolant hose -3- using hose clamp up to 25 mm - 3094- , release hose clip and disconnect coolant hose from coolant pipe on right side of gearbox.
- Release hose clip -2- and detach coolant pipe going to wheel housing (right-side).



Installing

permitted unless authorised by AUDI AG. AUDI AG does not accept responsibility for damage resulting from unauthorised modifications.

Installation is carried out in reverse order; note the following:



Note

*Secure all hose connections with the correct type of hose clips
(same as original equipment) ⇒ Electronic parts catalogue .*

- Check coolant level [⇒ page 207](#) .

Tightening torques

- ◆ [⇒ "3.1 Exploded view - coolant pipes", page 221](#)
- ◆ Air pipe [⇒ "3.1 Exploded view - air cleaner housing", page 295](#)
- ◆ [⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Exploded view - heat shield](#)
- ◆ [⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation](#)



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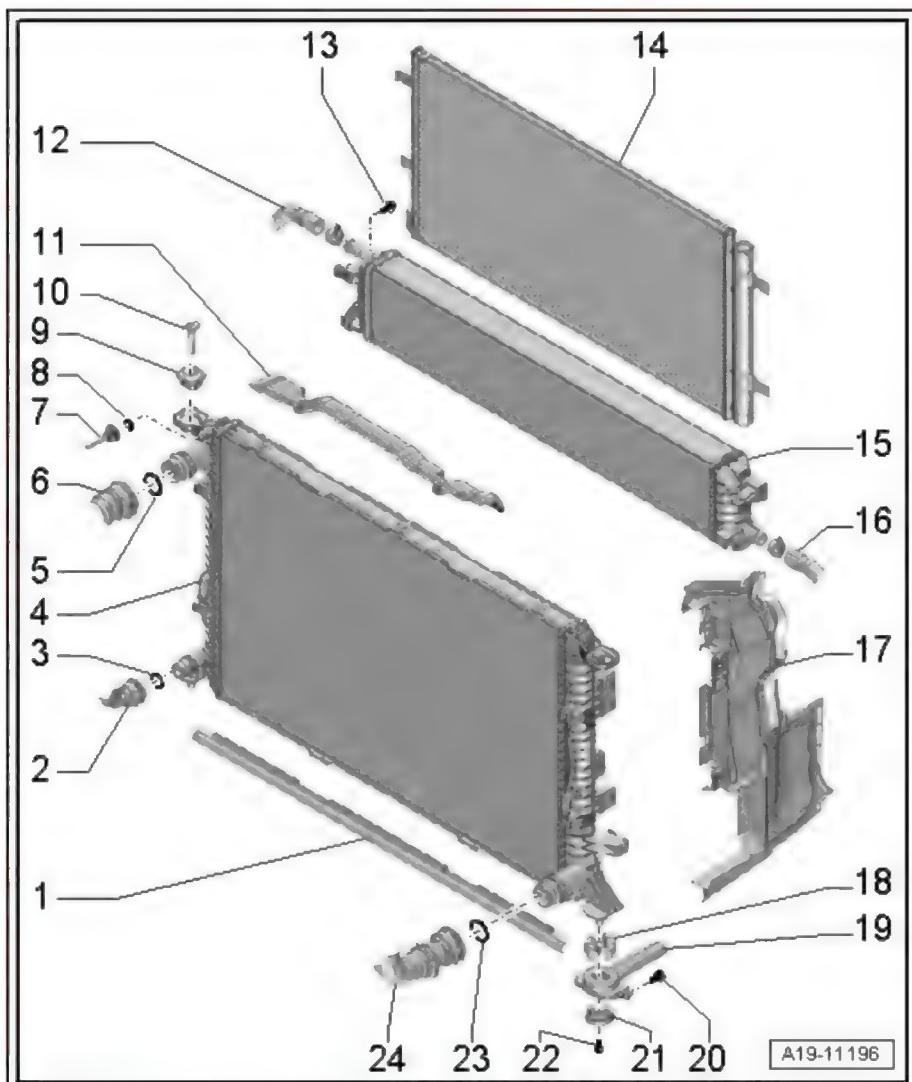
4 Radiators/radiator fans

- ⇒ "4.1 Exploded view - radiators/radiator fans", page 239
- ⇒ "4.2 Exploded view - auxiliary radiator", page 241
- ⇒ "4.3 Removing and installing radiator", page 242
- ⇒ "4.4 Removing and installing water radiator for charge air cooling circuit", page 246
- ⇒ "4.5 Removing and installing radiator cowl", page 249
- ⇒ "4.6 Removing and installing radiator fan V7", page 254
- ⇒ "4.7 Removing and installing auxiliary radiator", page 254

4.1 Exploded view - radiators/radiator fans

Radiator and water radiator (front) for charge air cooling circuit

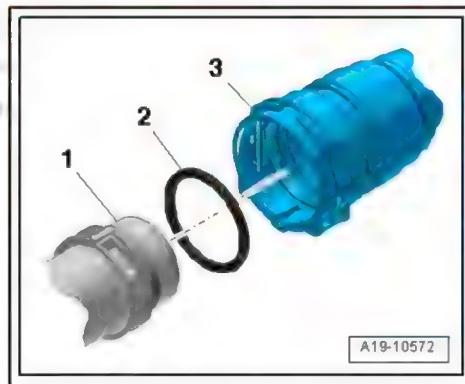
- 1 - Air duct
- 2 - Coolant hose
 - Lift retaining clip to detach
 - Connecting to radiator ⇒ Fig. "Connecting coolant hose with plug-in connector", page 240
- 3 - O-ring
 - Renew
- 4 - Radiator
 - Remove and install together with radiator cowl ⇒ "4.3 Removing and installing radiator", page 242
 - If renewed, change coolant in entire system
- 5 - O-ring
 - Renew
- 6 - Coolant hose
 - Lift retaining clip to detach
 - Connecting to radiator ⇒ Fig. "Connecting coolant hose with plug-in connector", page 240
- 7 - Coolant hose
 - Lift retaining clip to detach
 - Connecting to radiator ⇒ Fig. "Connecting coolant hose with plug-in connector", page 240
- 8 - O-ring
 - Renew
- 9 - Rubber bush



- For radiator
- 10 - Retaining pin
 - Use screwdriver to release and pull off
- 11 - Air duct
- 12 - Coolant hose
- 13 - Bolt
 - 4.5 Nm
- 14 - Condenser
 - Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser
- 15 - Water radiator (front) for charge air cooling circuit
 - Removing and installing ⇒ [“4.4 Removing and installing water radiator for charge air cooling circuit”, page 246](#)
- 16 - Coolant hose
- 17 - Air duct
- 18 - Rubber bush
 - For radiator
- 19 - Radiator bracket
- 20 - Bolt
 - 5 Nm
- 21 - Washer
- 22 - Bolt
 - 4.5 Nm
- 23 - O-ring
 - Renew
- 24 - Coolant hose
 - Lift retaining clip to detach
 - Connecting to radiator ⇒ [Fig. “Connecting coolant hose with plug-in connector” , page 240](#)

Connecting coolant hose with plug-in connector

- Remove old O-ring -2- from coolant hose -3-.
- Lightly lubricate new O-ring with coolant and fit O-ring in coolant hose.
- Press coolant hose onto connection -1- until it engages audibly.
- Press coolant hose in again and then pull to check that plug-in connector is correctly engaged.



Radiator cowl and radiator fans

1 - Radiator fan 2 - V177-

- With radiator fan control unit 2 - J671-
- Removing and installing
⇒ "4.6 Removing and installing radiator fan V7", page 254

2 - Radiator fan - V7-

- With radiator fan control unit - J293-
- Removing and installing
⇒ "4.6 Removing and installing radiator fan V7", page 254

3 - Radiator cowl

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 Removing and installing
⇒ "4.5.1 Removing and installing radiator cowl - with respect to Audi A6", page 249

- Removing and installing
⇒ "4.5.2 Removing and installing radiator cowl - Audi A7", page 251

4 - Bolt

- 3.5 Nm

5 - Fan wheel

- Pin must engage in hole

6 - Bolt

- 5 Nm

7 - Fan wheel

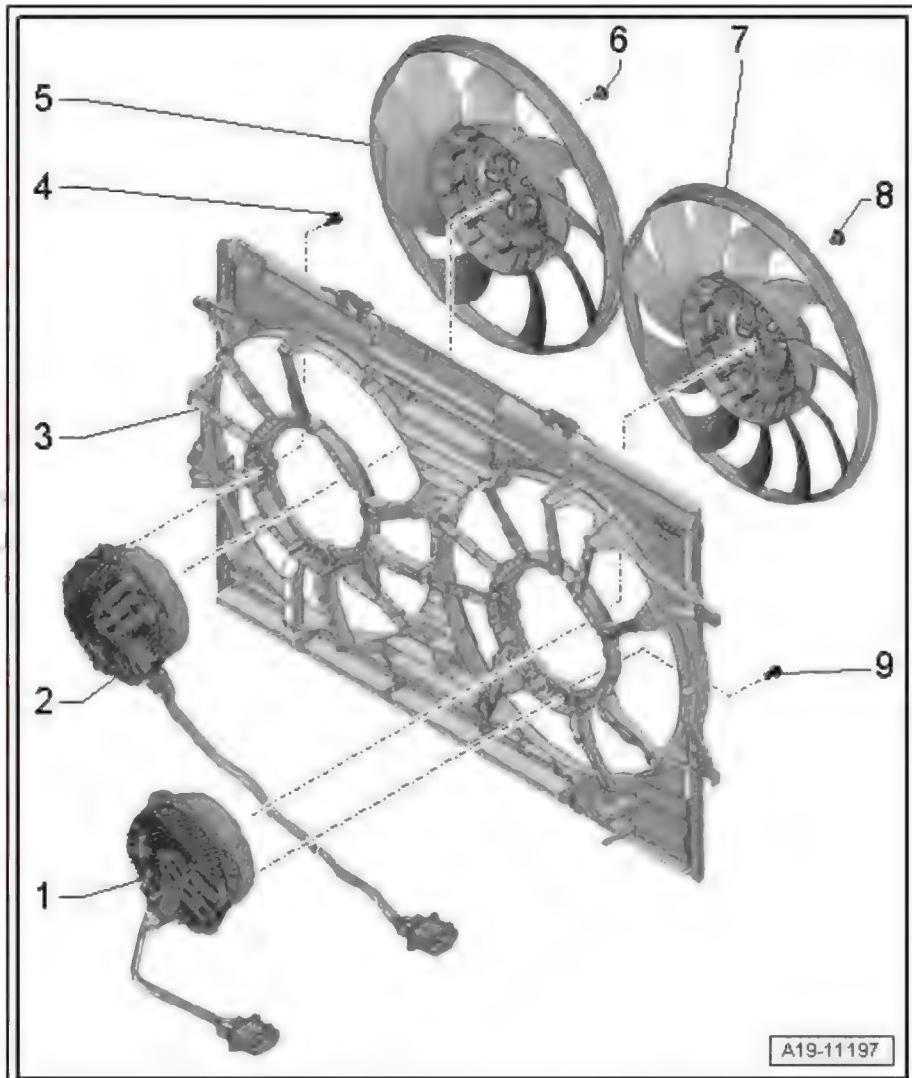
- Pin must engage in hole

8 - Bolt

- 5 Nm

9 - Bolt

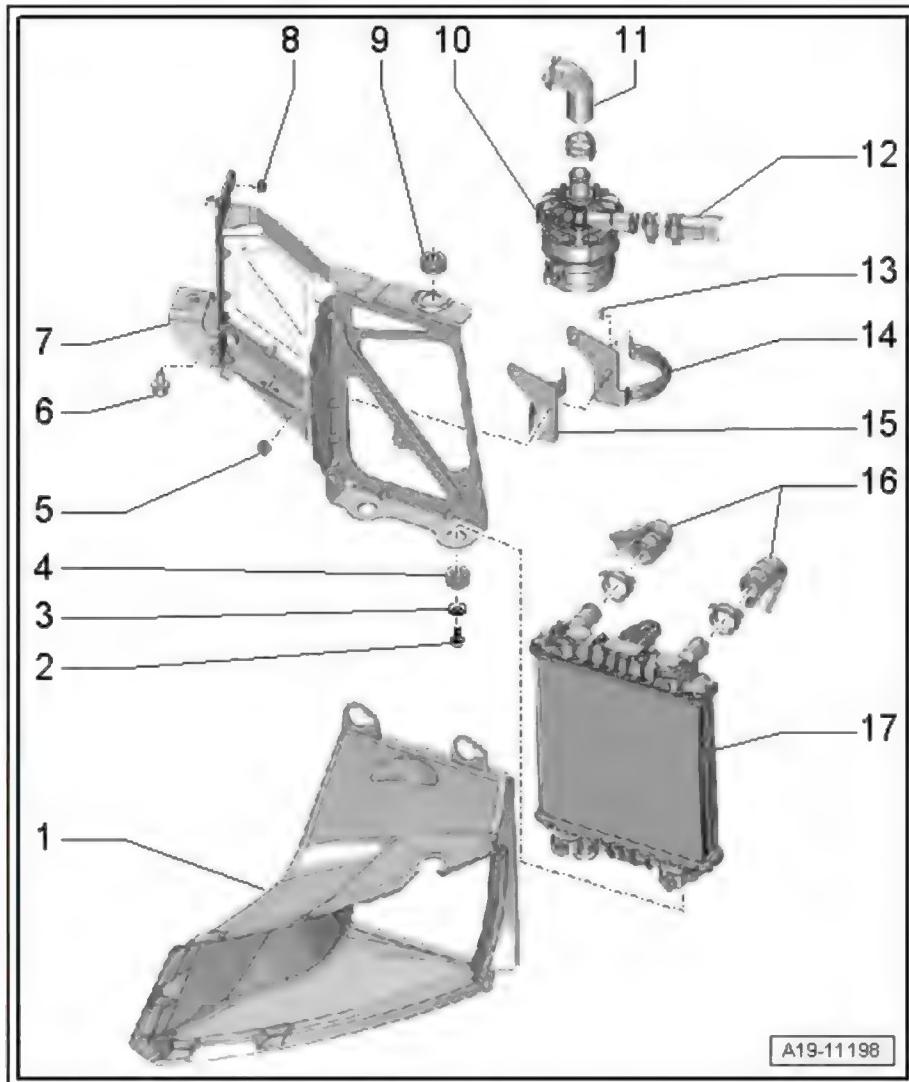
- 3.5 Nm



A19-11197

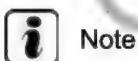
4.2 Exploded view - auxiliary radiator

- 1 - Air duct
- 2 - Bolt
 - 9 Nm
- 3 - Washer
- 4 - Rubber bush
 - For radiator
- 5 - Nut
 - 9 Nm
- 6 - Bolt
 - 22 Nm
- 7 - Bracket
- 8 - Nut
 - 22 Nm
- 9 - Rubber bush
 - For radiator
- 10 - Charge air cooling pump - V188-
 - Removing and installing
 ⇒ ["2.2 Removing and installing electric coolant pump", page 214](#)
- 11 - Coolant hose
- 12 - Coolant hose
- 13 - Nut
 - 9 Nm
- 14 - Bracket
 - For charge air cooling pump - V188-
- 15 - Bracket
 - For charge air cooling pump - V188-
- 16 - Coolant hoses
- 17 - Water radiator (left-side) for charge air cooling circuit
 - Removing and installing ⇒ ["4.7 Removing and installing auxiliary radiator", page 254](#)



A19-11198

4.3 Removing and installing radiator



Note

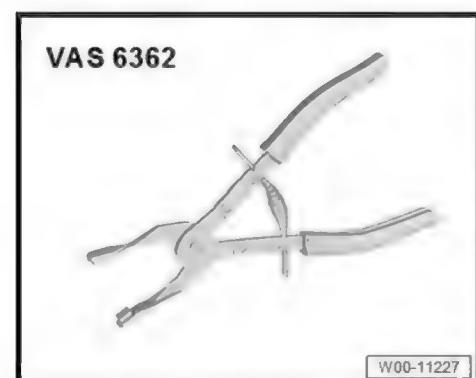
Radiator and radiator cowl can only be removed and installed together as one unit. This is permitted unless authorised by AUDI AG. AUDI AG does not guarantee any liability.

Special tools and workshop equipment required

- ◆ Drip tray for workshop hoist - VAS 6208-

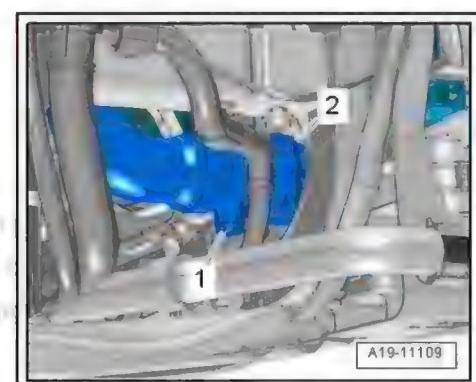


- ◆ Hose clip pliers - VAS 6362-

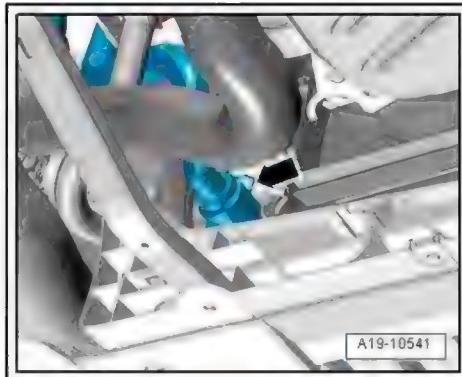


Removing

- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
 - Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .
 - Remove water radiator (front) for charge air cooling circuit page 246 .
 - Place drip tray for workshop hoist - VAS 6208- beneath engine.
 - Remove drain plug -1- and drain off coolant.
 - Lift retaining clip -2- and disconnect coolant hose from radiator.



- Detach connection from radiator (lift retaining clip -arrow-).

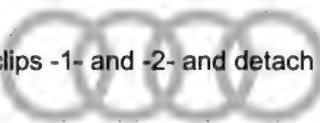


WARNING

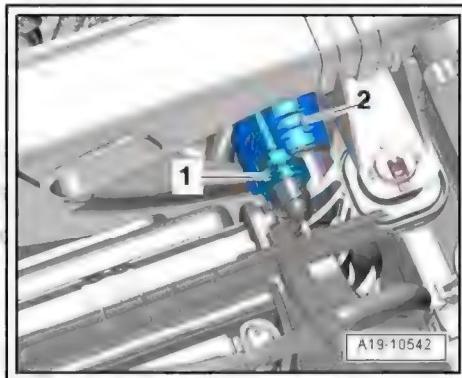
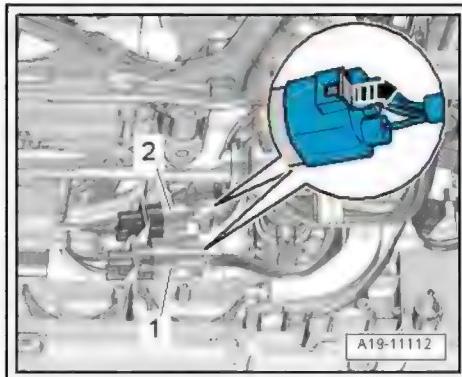
Risk of injury as the radiator fans may start up automatically.

- ◆ *Unplug electrical connectors before working in vicinity of radiator cowl.*

- Unplug electrical connectors -1- and -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).



- Lift retaining clips -1- and -2- and detach connection from radiator.

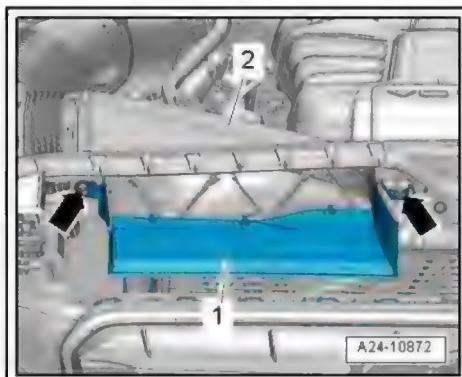


- Remove bolts -arrows- and detach air duct -1-.

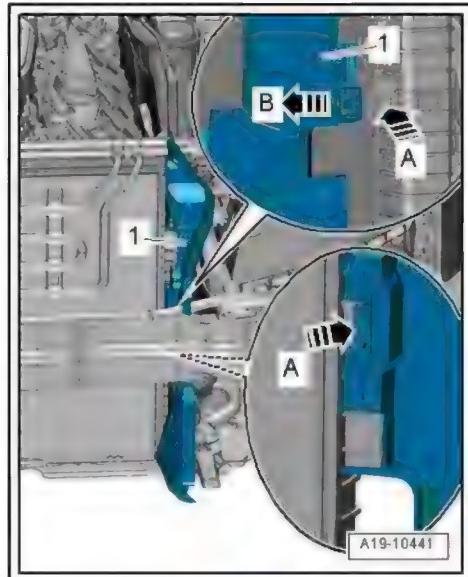


Note

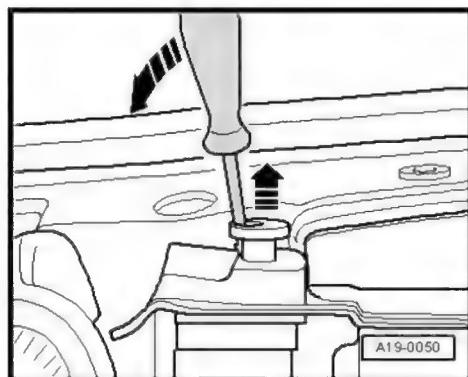
Disregard -item 2-.



- Release catches -arrows A- and detach air duct -1- on left and right -arrow B-.



- Release retaining pins for radiator on both sides and pull out upwards -arrows-.



- Have a second mechanic release retaining clips -1- in direction of -arrow A- and lift condenser -2- out of mountings on radiator -arrows B-.

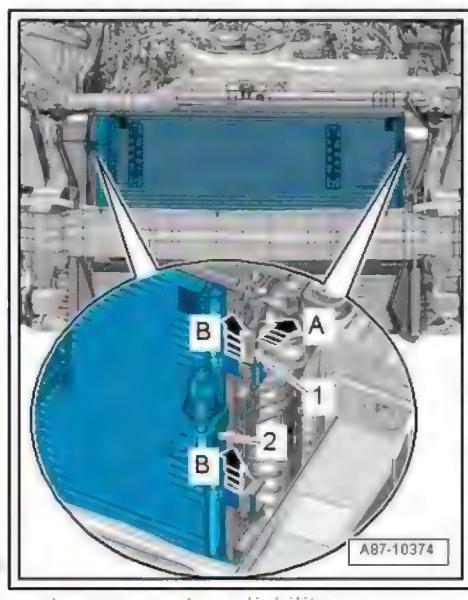
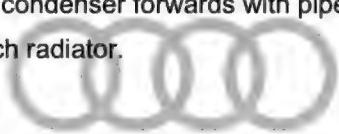


Caution

Risk of damage to condenser, refrigerant lines and refrigerant hoses.

◆ *Do NOT stretch, kink or bend refrigerant lines and hoses.*

- Pivot condenser forwards with pipes/hoses attached.
- Detach radiator.



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- Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.
- Slightly lower radiator.



- Press locking tabs on left and right sides of radiator cowl together -arrow- and lift radiator cowl off radiator.

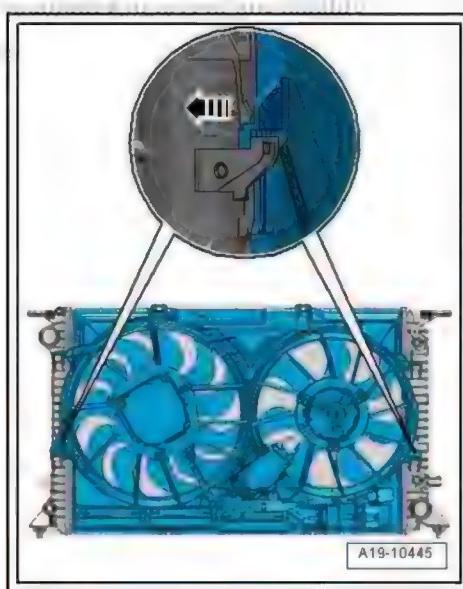
Installing

Installation is carried out in reverse order; note the following:



If there are slight impressions on the fins, refer to [page 6](#).

- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Connect coolant hose with plug-in connector [page 240](#).
- Install water radiator (front) for charge air cooling circuit [page 246](#).
- Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover.



Do not reuse coolant.

- Fill up with coolant [page 207](#).

Tightening torques

- ◆ ⇒ "4.1 Exploded view - radiators/radiator fans", page 239
- ◆ Air duct ⇒ "3.1 Exploded view - air cleaner housing", page 295
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

4.4 Removing and installing water radiator for charge air cooling circuit

Special tools and workshop equipment required

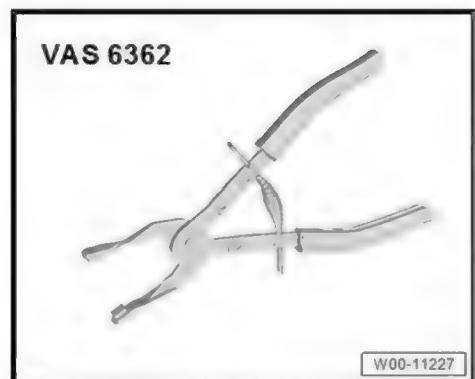
- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Drip tray for workshop hoist - VAS 6208-



- ◆ Hose clip pliers - VAS 6362-



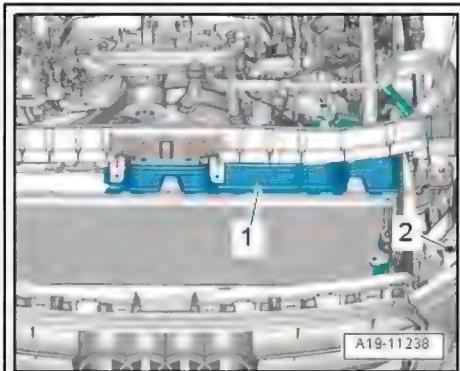
Removing

- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Remove closure plate for bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .

- Remove bolt -2- on both sides and press bumper cover forwards slightly.

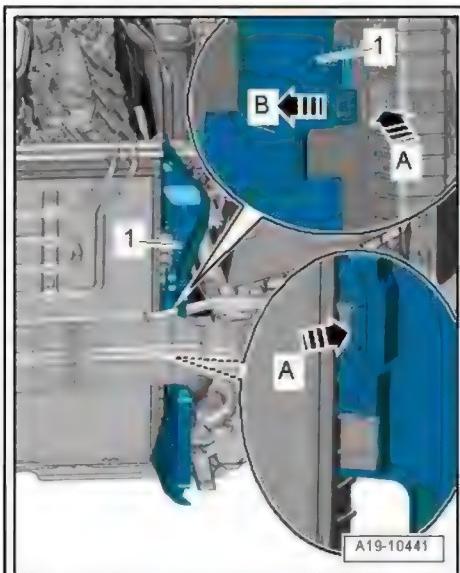


Disregard -item 1-

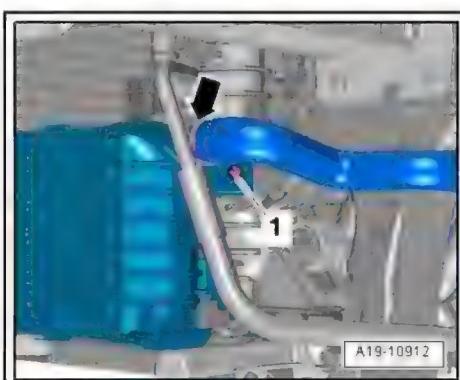


For illustration purposes, the installation position is shown in the following illustrations with the bumper removed.

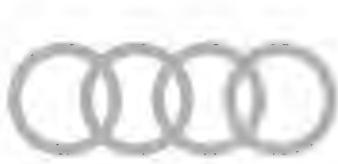
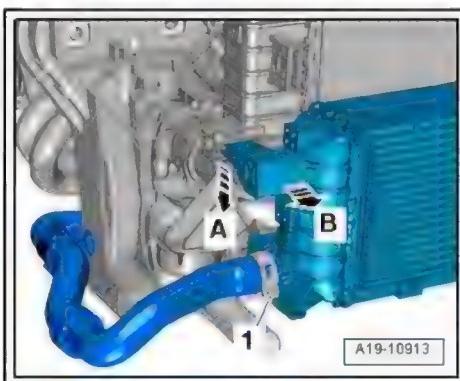
- Release catches -arrows A- and swivel air duct -1- on left and right to centre of vehicle -arrow B-.



- Place drip tray for workshop hoist - VAS 6208- beneath water radiator (front) for charge air cooling circuit.
- Clamp off coolant hose using hose clamp up to 25 mm - 3094- , release hose clip -arrow- and disconnect hose.
- Remove bolt -1-.



- Clamp off coolant hose using hose clamp up to 25 mm - 3094- , release hose clip -1- and disconnect hose.
- Push catch down -arrow A- and move water radiator (front) for charge air cooling circuit slightly in direction of -arrow B-.



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- Lift water radiator (front) for charge air cooling circuit off radiator -arrows A- and swivel in direction of -arrow B-.
- Detach water radiator (front) for charge air cooling circuit from right side downwards -arrow C-.

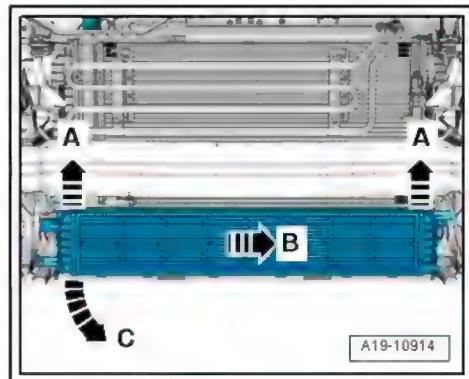
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ If there are slight impressions on the fins, refer to [⇒ page 6](#).
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue*.



A19-10914

- Install bumper cover, closure plate and lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .



Note

Do not reuse coolant.

Fill up with coolant [⇒ page 207](#)

Tightening torques

- ◆ [⇒ "4.1 Exploded view - radiators/radiator fans", page 239](#)

4.5 Removing and installing radiator cowl

[⇒ "4.5.1 Removing and installing radiator cowl - Audi A6", page 249](#)

[⇒ "4.5.2 Removing and installing radiator cowl - Audi A7", page 251](#)

4.5.1 Removing and installing radiator cowl - Audi A6

Special tools and workshop equipment required

- ◆ Drip tray for workshop hoist - VAS 6208-



W00-11209

Removing

- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .

- Remove bolts -arrows- and detach air duct -1-.

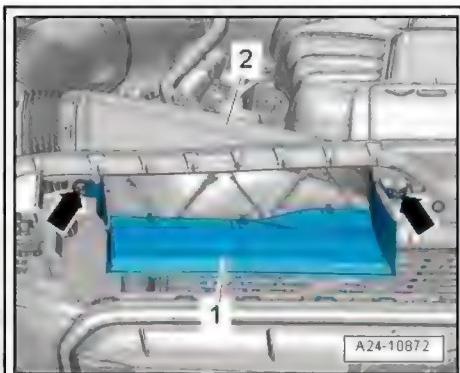


- Remove bolts -arrows- and detach air duct -1-.

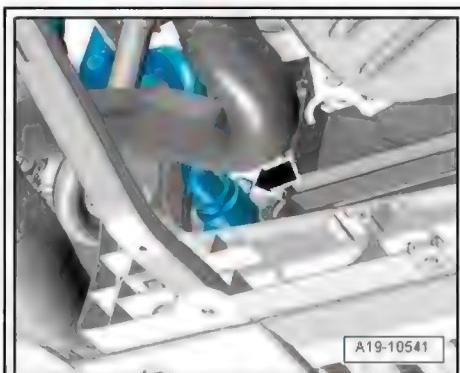
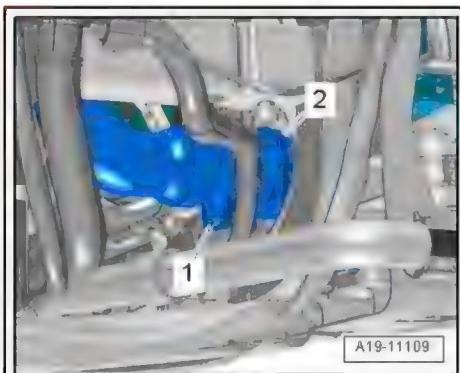
 Note

Disregard -item 2-

- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation.
- Remove closure plate for bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments.
with respect to the correctness of information in this document
- Remove water radiator for charge air cooling circuit ⇒ ["4.4 Removing and installing water radiator for charge air cooling circuit", page 246](#).
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Remove drain plug -1- and drain off coolant.
- Lift retaining clip -2- and disconnect coolant hose from radiator.



- Detach connection from radiator (lift retaining clip -arrow-).





WARNING

Risk of injury as the radiator fans may start up automatically.

- ◆ *Unplug electrical connectors before working in vicinity of radiator cowl.*

- Take electrical connector -1- for radiator fan out of bracket and unplug connector (push retainer to the rear -arrow- and press down release catch).
- Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.
- Press radiator slightly towards front.



- ! Radiator cowl is held by two locking tabs on left and right sides. Lift the cowl simultaneously at both sides until it is clear of the lock carrier.
- Press locking tabs on left and right sides of radiator cowl simultaneously -arrow-, lift radiator cowl off radiator and remove from below.

Installing

Installation is carried out in reverse order; note the following:

- Connect coolant hose with plug-in connector ⇒ Fig. “[Connecting coolant hose with plug-in connector](#)”, page 240 .
- Install bumper cover, closure plate and lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .



Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 207](#) .

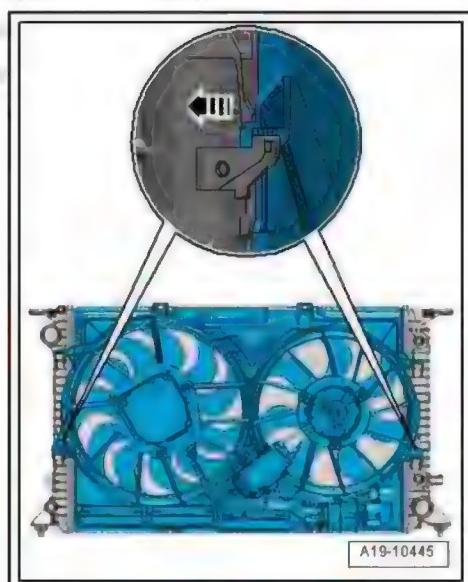
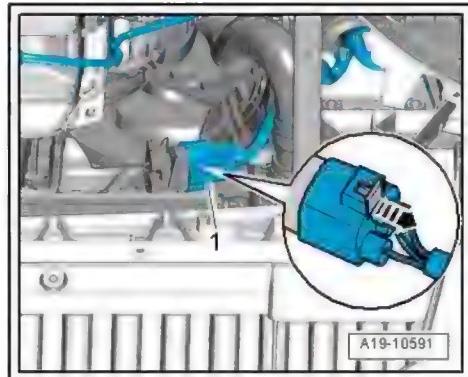
Tightening torques

- ◆ ⇒ “[4.1 Exploded view - radiators/radiator fans](#)”, page 239
- ◆ ⇒ “[3.1 Exploded view - air cleaner housing](#)”, page 295
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

4.5.2 Removing and installing radiator cowl - Audi A7

Removing

- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .





WARNING

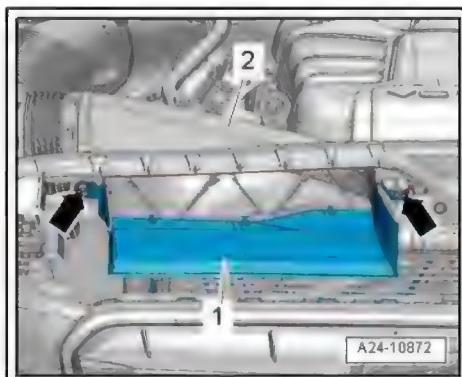
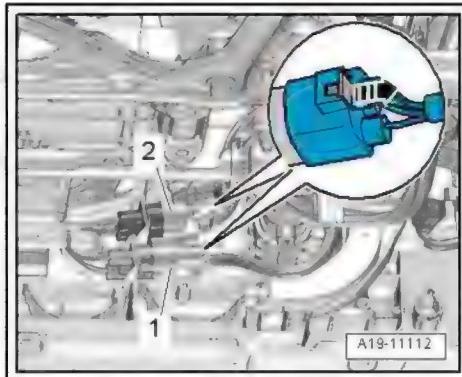
Risk of injury as the radiator fans may start up automatically.

- ◆ Unplug electrical connectors before working in vicinity of radiator cowl.

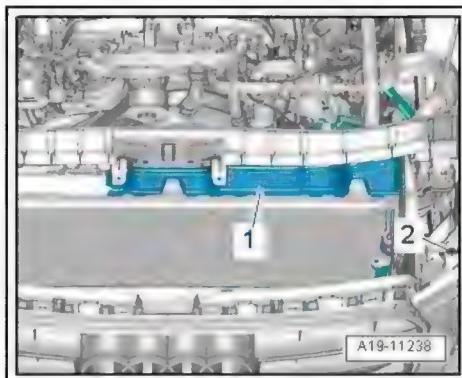
- Unplug electrical connectors -1- and -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).
- Remove closure plate for bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Remove bolts -arrows- and detach air duct -1-.



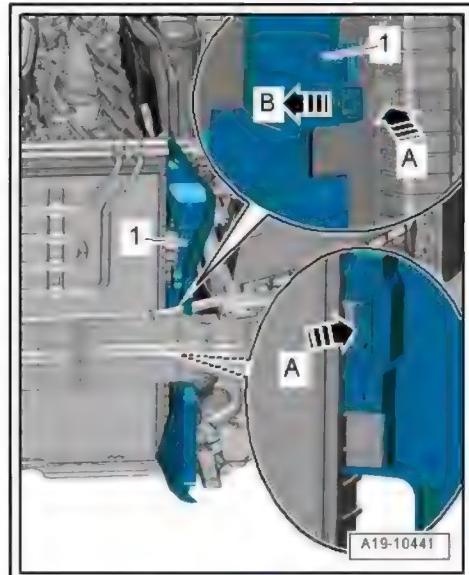
Disregard -item 2-.



- Detach air duct -1-.
- Remove bolt -2- on both sides and press bumper cover forwards slightly.



- Release catches -arrows A- and swivel air duct -1- on left and right to centre of vehicle -arrow B-.



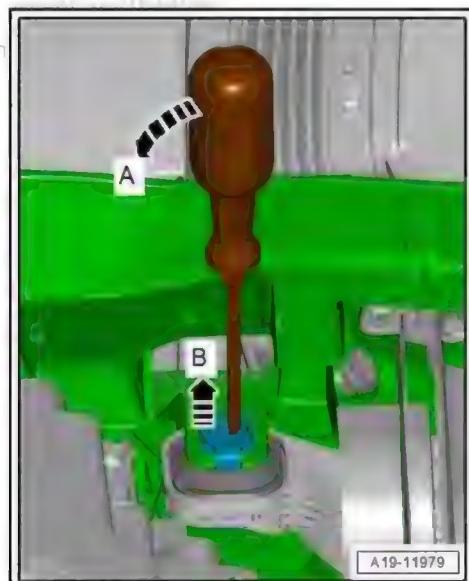
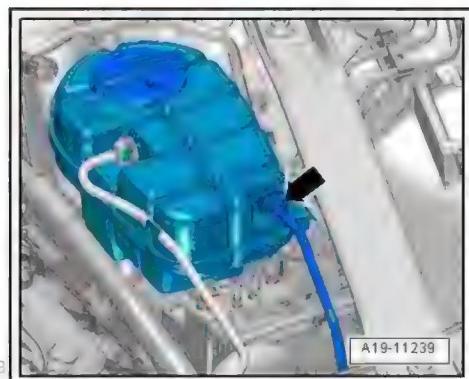
- Lift retaining clip -arrow- and disconnect coolant hoses from coolant expansion tank.



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- Release retaining pins for radiator on both sides -arrow A- and with pull out upwards -arrow B- of information in this document. Copyright © AUDI AG 2018.

- Press radiator slightly towards front.



- Press locking tabs on left and right sides of radiator cowl together -arrow- and lift radiator cowl off radiator.

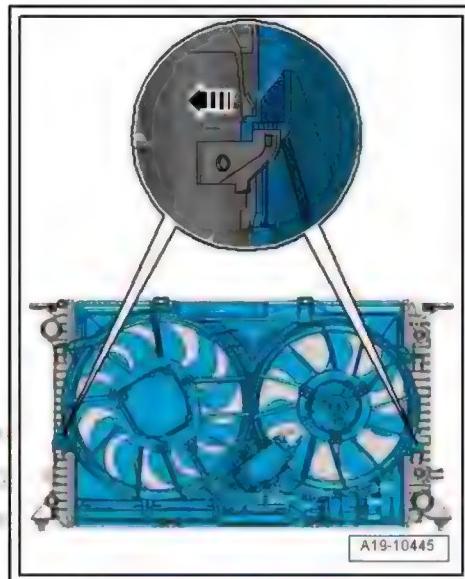
Installing

Installation is carried out in reverse order; note the following:

- Install bumper cover, closure plate and lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - radiators/radiator fans”, page 239](#)
- ◆ ⇒ [“3.1 Exploded view - air cleaner housing”, page 295](#)
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation



4.6 Removing and installing radiator fan - V7-

Removing



Note

Fit all cable ties in the original positions when installing.

- Remove radiator cowl ⇒ [page 249](#) .
- Remove bolts -1- or -2- and detach corresponding fan wheel.
- Remove bolts -arrows- on radiator fan.
- Move electrical wiring harness clear and detach radiator fan.



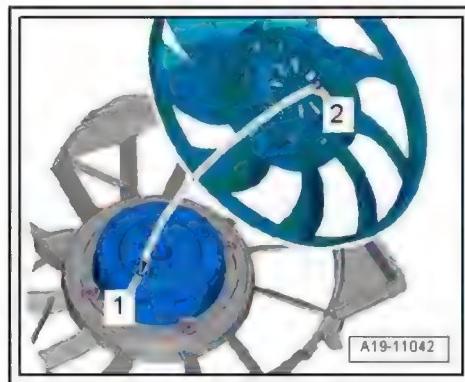
Installing

Installation is carried out in reverse order; note the following:

- Note installation position of fan wheel.
- Pin -2- must engage in hole -1-.
- Install radiator cowl ⇒ [page 249](#) .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - radiators/radiator fans”, page 239](#)



4.7 Removing and installing auxiliary radiator

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



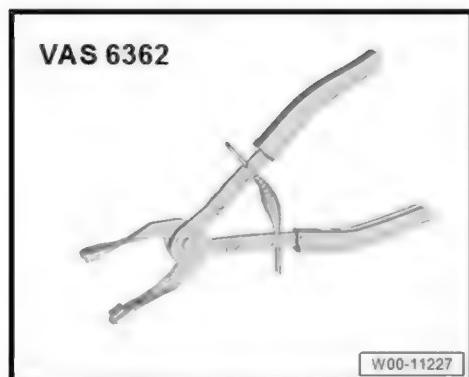
W00-11130

- ◆ Drip tray for workshop hoist - VAS 6208-



W00-11209

- ◆ Hose clip pliers - VAS 6362-



W00-11227

Removing

- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Remove front left wheel spoiler ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .
- Remove closure plate for bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .

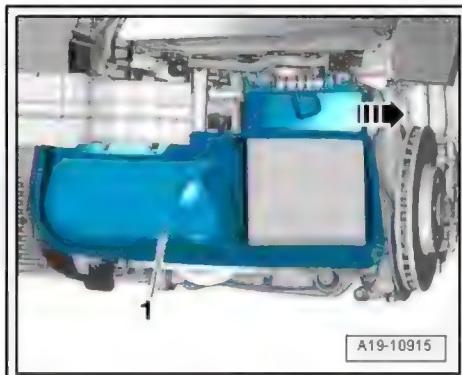


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prevented to see a color version of the document, please contact your supplier or send an e-mail to
informing us the missing of information in this document. Issued by Audi AG.

 Note

For illustration purposes, the installation position is shown with the bumper removed in the following illustration.

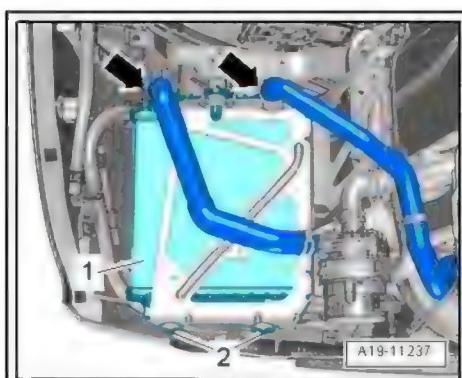
- Detach air duct -1- -arrow-.



- Place drip tray for workshop hoist - VAS 6208- beneath water radiator (left-side) for charge air cooling circuit.
- Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect hoses.
- Remove bolts -2-.
- Lift water radiator (left-side) -1- for charge air cooling circuit off bracket.

Installing

Installation is carried out in reverse order; note the following:



 Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue*.

- Remove closure plate for bumper cover ⇒ *General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments*.

 Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 207](#).

Tightening torques

- ◆ ⇒ [“4.2 Exploded view - auxiliary radiator”, page 241](#)
- ◆ Front wheel spoiler ⇒ *General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)*
- ◆ ⇒ *General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation*

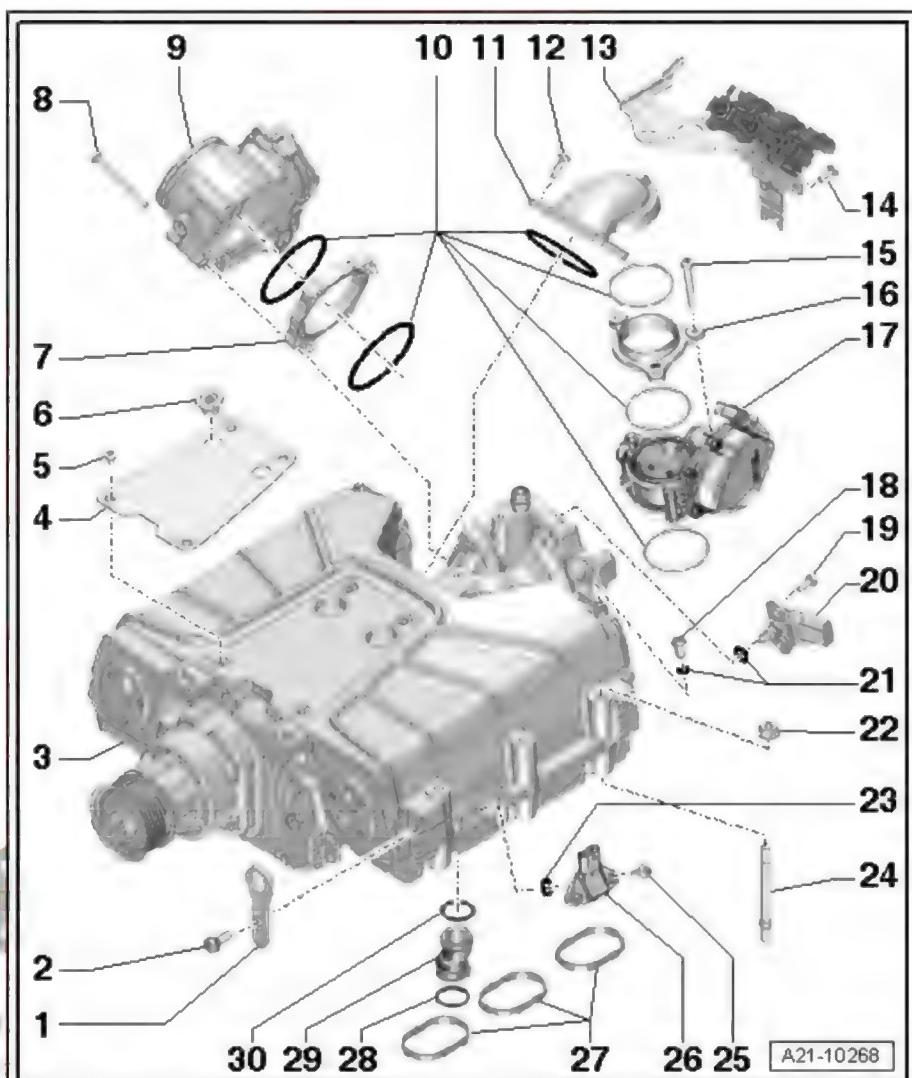
21 – Turbocharging/supercharging

1 Supercharger

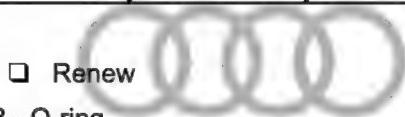
- ⇒ “1.1 Exploded view - supercharger”, page 257
- ⇒ “1.2 Exploded view - drive unit”, page 259
- ⇒ “1.3 Removing and installing supercharger”, page 259
- ⇒ “1.4 Checking supercharger for leaks”, page 263
- ⇒ “1.5 Removing and installing drive unit and damper spring”, page 265
- ⇒ “1.6 Securing supercharger to engine and gearbox support”, page 267

1.1 Exploded view - supercharger

- 1 - Engine lifting eye
- 2 - Bolt
 - 27 Nm
- 3 - Supercharger
 - With charge air coolers
 - Removing and installing supercharger ⇒ “1.3 Removing and installing supercharger”, page 259
 - Exploded view - charge air system ⇒ “2.1 Exploded view - charge air system”, page 271
 - Secure to engine and gearbox support - VAS 6095- when performing assembly work ⇒ “1.6.1 Securing supercharger to engine and gearbox support for assembly work”, page 268
 - Secure to engine and gearbox support - VAS 6095- when checking for leaks ⇒ “1.6.2 Securing supercharger to engine and gearbox support for leak test”, page 269
- 4 - Insulating plate
- 5 - Bolt
 - 5 Nm
- 6 - Rubber grommet
- 7 - Intermediate flange
- 8 - Bolt



- Tightening torque ⇒ Fig. ““ Throttle valve module -J338- - tightening torque ””, page 299
- 9 - Throttle valve module - J338-
 - Removing and installing ⇒ “4.3 Removing and installing throttle valve module J338 ”, page 303
- 10 - O-rings
 - Renew
- 11 - Connection
- 12 - Bolt
 - Tightening torque and sequence ⇒ Fig. ““ Regulating flap control unit -J808- - tightening torque and sequence ””, page 300
- 13 - Bracket
 - For change-over valves
- 14 - Bolt
 - 9 Nm
- 15 - Bolt
 - Tightening torque and sequence ⇒ Fig. ““ Regulating flap control unit -J808- - tightening torque and sequence ””, page 300
- 16 - Intermediate flange
- 17 - Regulating flap control unit - J808-
 - Removing and installing ⇒ “4.5 Removing and installing regulating flap control unit J808 ”, page 305
- 18 - Bleeder screw
 - For charge air cooler (left-side)
 - 1.5 ... 3.0 Nm
- 19 - Bolt
 - Tightening torque ⇒ Fig. ““ Intake air temperature sender -G42- / intake manifold pressure sender -G71- - tightening torque ””, page 299
- 20 - Intake air temperature sender - G42-
 - Removing and installing ⇒ “6.1 Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71 ”, page 311
- 21 - O-rings
 - Renew
- 22 - Nut
 - 20 Nm
- 23 - O-ring
 - Renew
- 24 - Threaded pin
 - 17 Nm
- 25 - Bolt
 - Self-locking
 - Renew
 - Before assembly, always remove residues from threaded holes using a thread tap
 - 10 Nm
- 26 - Charge pressure sender
 - Cylinder bank 1 (right-side): charge pressure sender - G31-
 - Cylinder bank 2 (left-side): charge pressure sender 2 - G447-
 - Removing and installing ⇒ “2.4 Removing and installing charge pressure sender G31 / G447 ”, page 275
- 27 - Seals



- Renew

28 - O-ring

- 2x on USA versions
- Renew

29 - Connection

- For crankcase breather
- Installation position ⇒ Fig. "Installing connection for crankcase breather", page 189

30 - O-ring

- 2x on USA versions
- Renew

1.2 Exploded view - drive unit

1 - Bolt

- Self-locking
- Renew
- Before assembly, always remove residues from threaded holes using a thread tap
- 25 Nm

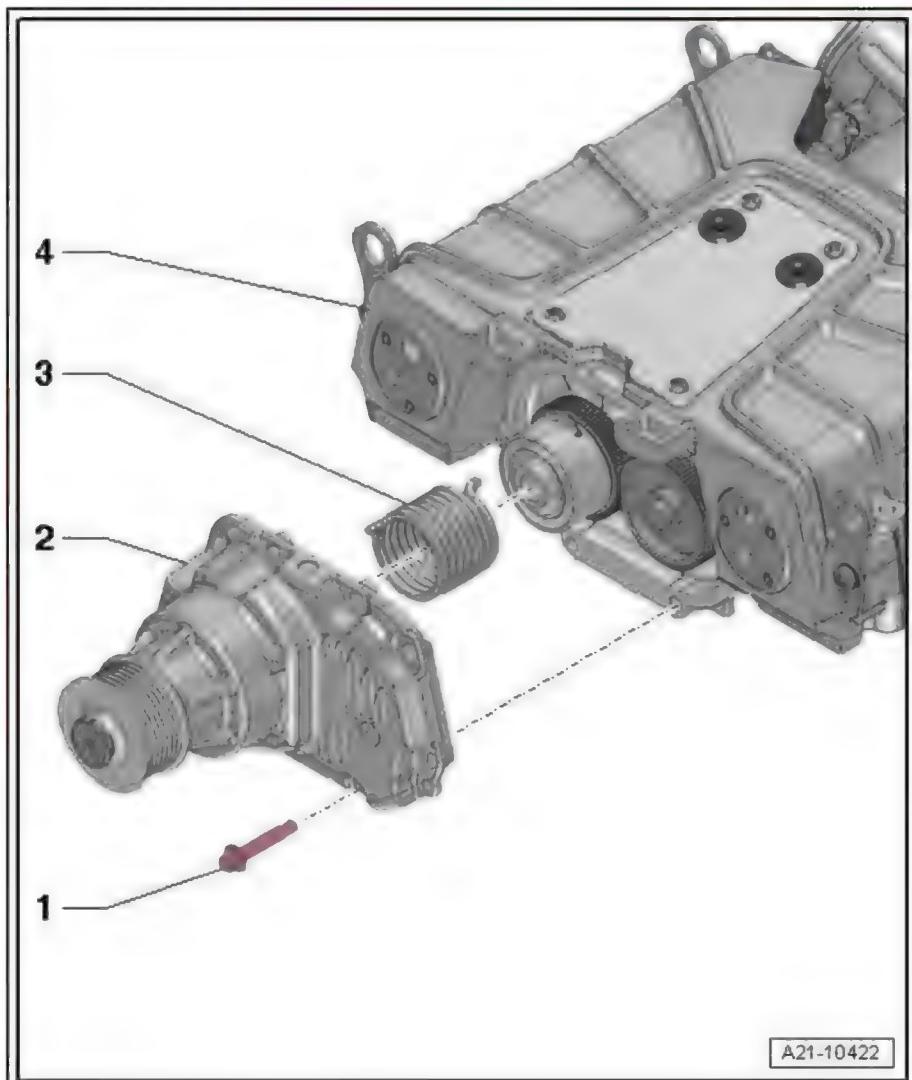
2 - Drive unit

- Removing and installing
⇒ "1.5 Removing and installing drive unit and damper spring", page 265

3 - Damper spring

- Removing and installing
⇒ "1.5 Removing and installing drive unit and damper spring", page 265

4 - Supercharger housing



1.3 Removing and installing supercharger

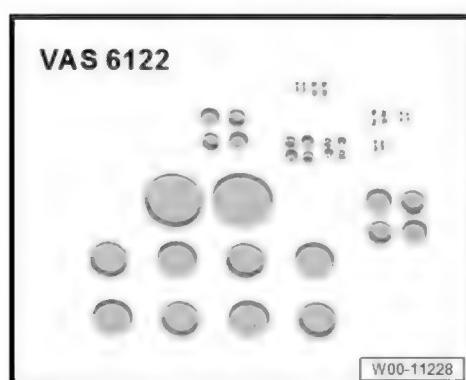
Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



W00-11130

- ◆ Engine bung set - VAS 6122-



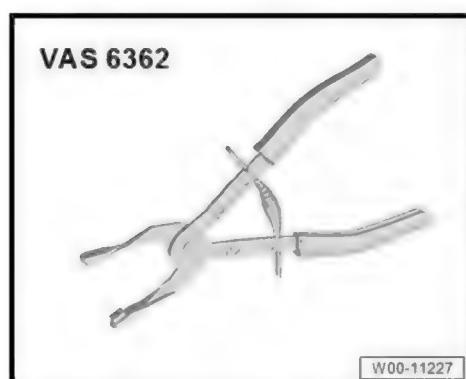
W00-11228

- ◆ Drip tray for workshop hoist - VAS 6208-



W00-11209

- ◆ Hose clip pliers - VAS 6362-



W00-11227

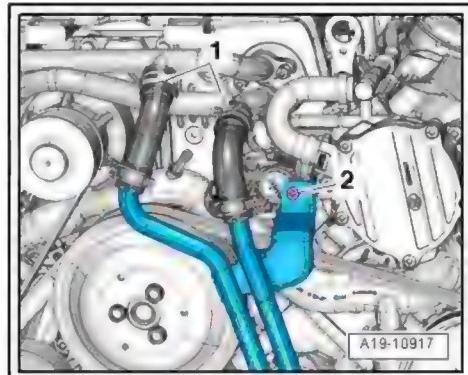
Removing

- Remove poly V-belt for supercharger [⇒ page 71](#).
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Clamp off coolant hoses using hose clamps, up to 25 mm - 3094-, release hose clips -1- and disconnect coolant hoses from coolant pipes at supercharger.

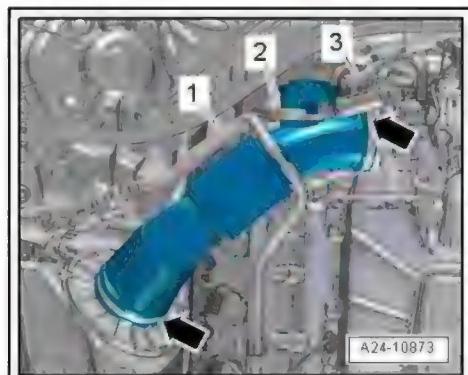


Note

- ◆ For illustration purposes, the installation position is shown with the engine removed.
- ◆ Disregard -item 2-.



- Remove engine cover panel (rear) [⇒ page 67](#).
- Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Loosen hose clips -arrows- and detach air pipe.

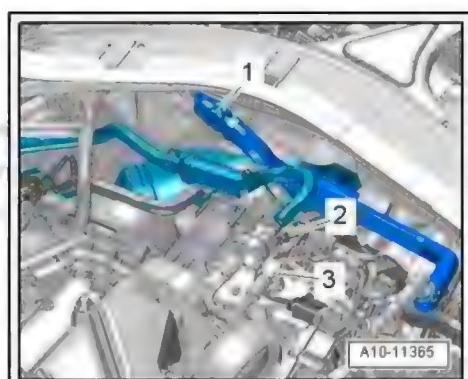


- Unplug electrical connector -2- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -3- (press release tabs).
- Take activated charcoal filter solenoid valve 1 - N80- out of bracket and move to side with hose attached.

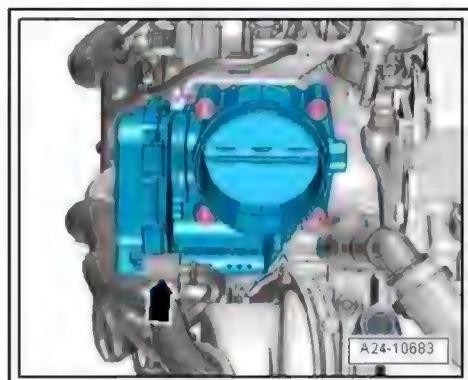


Note

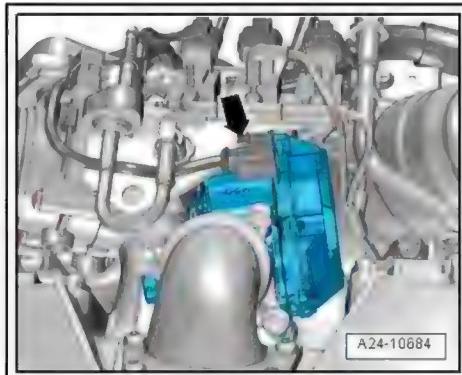
Disregard -item 1-.



- Unplug electrical connector -arrow- at throttle valve module - J338- .



- Unplug electrical connector -arrow- at regulating flap control unit - J808- .



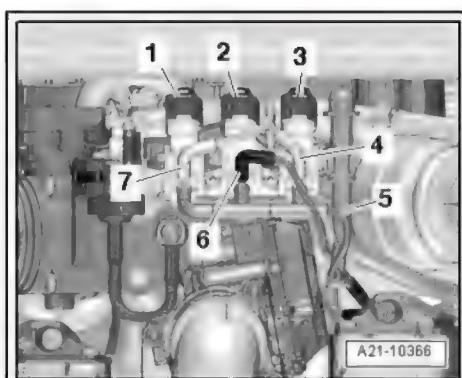
- Unplug electrical connectors -1, 2, 3-.



Note

Mark position of vacuum hoses for re-installation.

- Disconnect vacuum hoses -4 ... 7-.

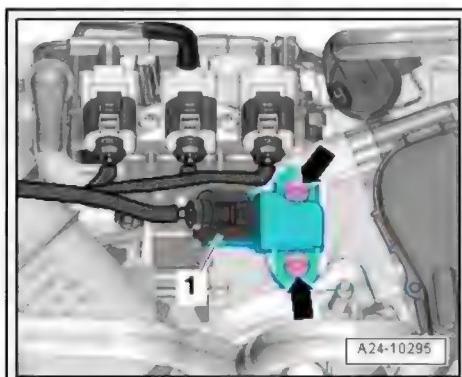


- Unplug electrical connector -1- at intake air temperature sender - G42- / intake manifold pressure sender - G71- .

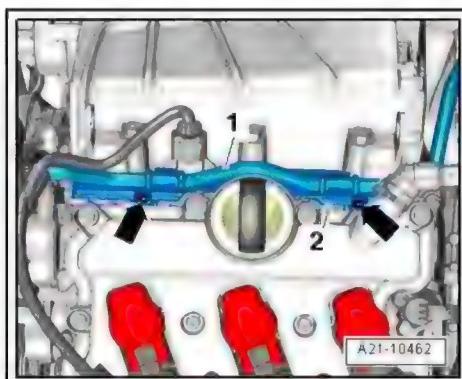
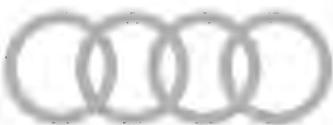


Note

Disregard -arrows-.

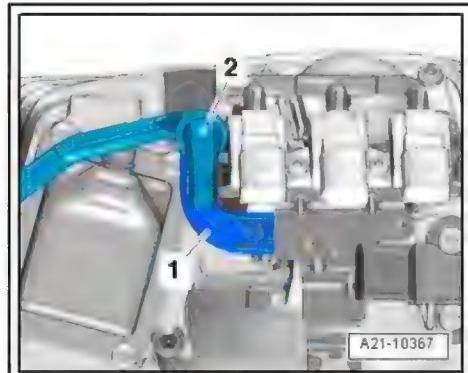


- Move clear vacuum hose -1-.
- Remove bolts -arrows- on both sides and detach cover -2-.



Important tip: Do not lift or move the engine cover by its handle. Doing so may damage the cover's mounting brackets. If the engine cover must be moved, always do so by holding it firmly at the front edge. Do not hold it by the handle or by the rear edge. Do not lift the engine cover by its handle. Doing so may damage the cover's mounting brackets. If the engine cover must be moved, always do so by holding it firmly at the front edge. Do not hold it by the handle or by the rear edge.

- Move clear vacuum hose -2- leading to brake servo at bracket -1-.



- Unplug electrical connectors -1- and -2-.
- Remove nuts -arrows- and lift off supercharger with charge air coolers.
- Protect the supercharger with a cloth to prevent damage to the paint surface.
- With respect to the correctness of information in the diagrammatic drawings.
- Seal openings on supercharger and all relevant ducts and hoses of the charge air system with plugs from engine bung set - VAS 6122- .

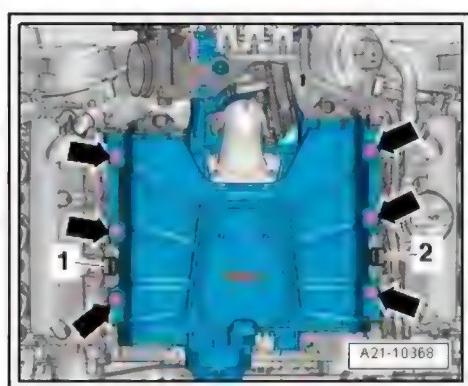
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ Renew seals and/or gaskets.
- ◆ Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .
- ◆ To ensure that the air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.
- Ensure that crankcase breather connection is positioned correctly ⇒ [page 189](#) when fitting supercharger.
- Install poly V-belt for supercharger ⇒ [page 71](#) .



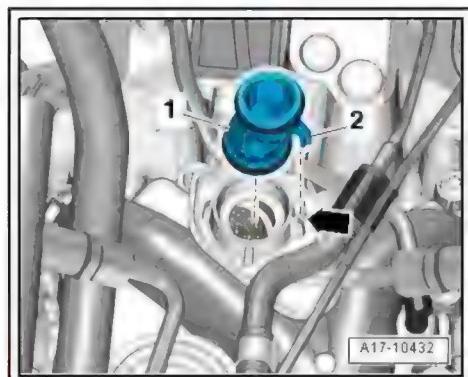
Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 207](#) .

Tightening torques

- ◆ ⇒ “1.1 Exploded view - supercharger”, page 257
- ◆ Air pipe ⇒ “3.1 Exploded view - air cleaner housing”, page 295



1.4 Checking supercharger for leaks

Special tools and workshop equipment required

- ◆ Charge air system tester - V.A.G 1687- with adapters - V.A.G 1687/10- , -V.A.G 1687/13-1- , -V.A.G 1687/13-2- and -V.A.G 1687/13-3-



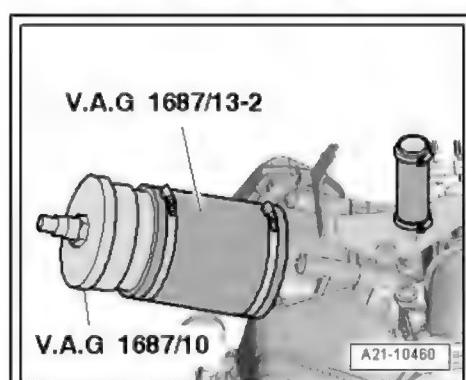
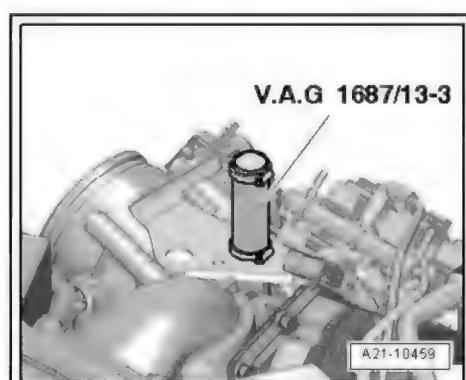
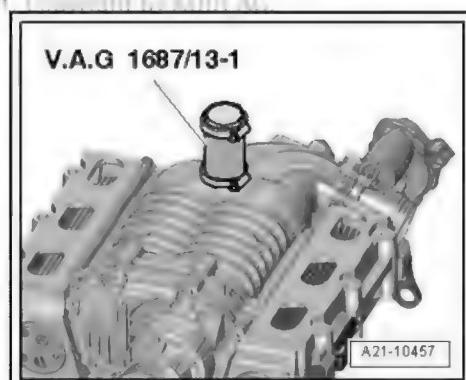
Procedure

- Supercharger secured to engine and gearbox support - VAS 6095- for leak test [⇒ page 268](#).
- Regulating flap control unit - J808- installed [⇒ page 305](#).
- Secure -V.A.G 1687/13-1- to bottom of supercharger housing.
- Secure hose connections with hose clips.



Note

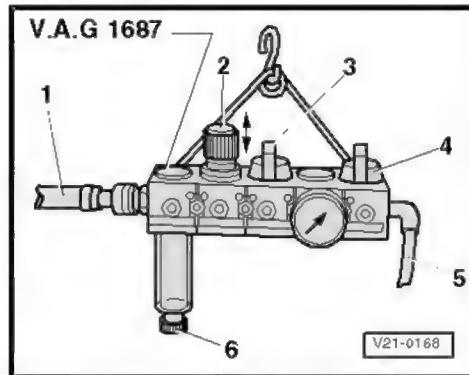
For illustration purposes the supercharger is shown without the gearbox support.



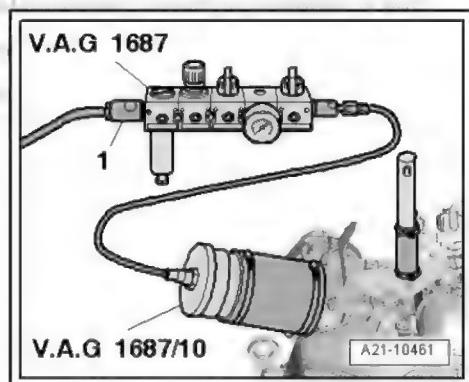
- Secure -V.A.G 1687/13-3- to top of supercharger housing.
 - Secure hose connections with hose clips.
-
- Secure -V.A.G 1687/13-2- to supercharger housing with adapter - V.A.G 1687/10- .
 - Secure hose connections with hose clips.

Prepare charge air system tester - V.A.G 1687- as follows:

- Unscrew pressure control valve -2- completely and close valves -3- and -4-.
- Make sure knob is pulled out before turning pressure control valve.



- Connect charge air system tester - V.A.G 1687- as shown in illustration, and connect to compressed air line using a commercially available connection piece -1-.



- If there is water in sight glass, remove drain plug -6- and drain water.
- Open valve -3-.



Caution

Risk of damage if pressure is set too high.

- ◆ *The pressure must not exceed 0.5 bar.*

- Adjust pressure to 0.5 bar via pressure control valve -2-.
- Open valve -4- and wait until test system is pressurised. If necessary, adjust pressure to 0.5 bar again.
- Close valve -3-.
- Pressure must not drop by more than 0.1 bar for 30 seconds.
- Check charge air system for audible leaks or leaks that can be felt with the hand; apply commercially available leak detecting spray or use ultrasonic tester - V.A.G 1842- .

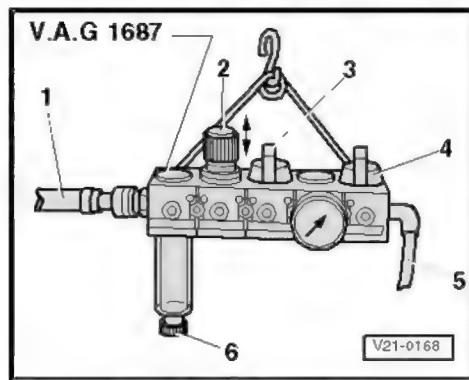


Note

- ◆ *For operation of ultrasonic tester -V.A.G 1842- , refer to ⇒ Operating instructions .*
- ◆ *Release pressure in test circuit by detaching hose coupling from adapter before removing adapter.*

1.5 Removing and installing drive unit and damper spring

Special tools and workshop equipment required



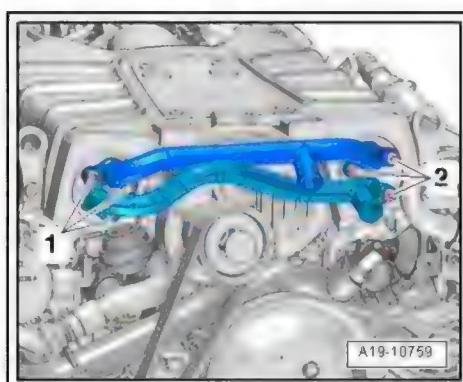
- Used oil collection and extraction unit - VAS 6622A-



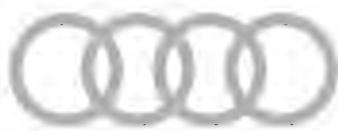
- Sealant ⇒ Electronic parts catalogue
- Oil for supercharger drive ⇒ Electronic parts catalogue
- Spreader tool (commercially available)

Removing

- Supercharger secured to engine and gearbox support - VAS 6095- [⇒ page 268](#).
- Detach coolant pipes from supercharger [⇒ page 234](#).
- Position supercharger vertically in engine and gearbox support.
- Drive unit faces upwards.



- Remove bolts -arrows-.

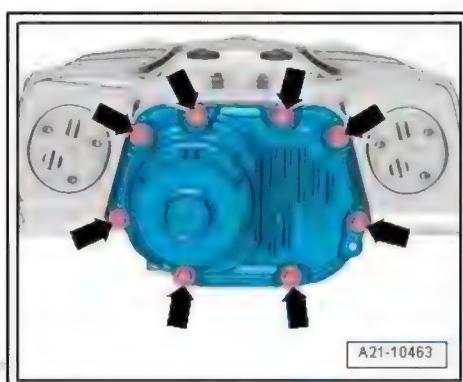


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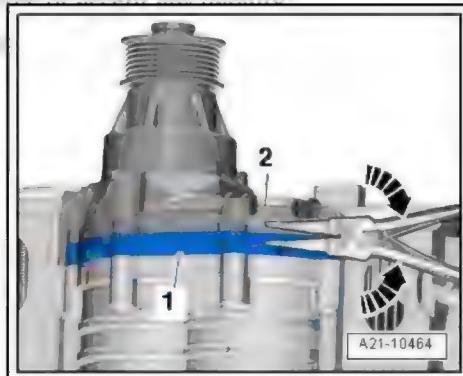


Caution

- To make sure bearing cover -1- does not come loose and remains properly sealed, always use spreader tool -arrows- to press off drive unit -2- as shown in illustration (do not use a hammer).



- Carefully press off drive unit from bearing cover and detach.
- Detach damper spring.



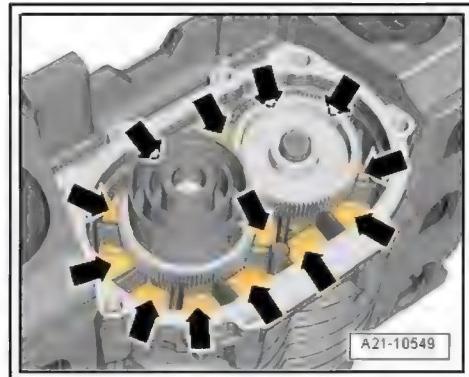
- With the aid of used oil collection and extraction unit - VAS 6622A-, extract all oil for supercharger drive from bearing cover (including oil chambers -arrows- between ribs).

Installing



Note

- ◆ Renew the drive unit bolts.
- ◆ Fit self-locking bolts or insert bolts with locking fluid ⇒ Electronic parts catalogue .



- Clean sealing surfaces; they must be free of oil and grease.
- Before assembly, always remove residues from threaded holes for drive unit in bearing cover using a thread tap.
- Fill bearing cover with oil for supercharger drive.



Note

The container is filled with the required amount of oil. It is not possible to check the oil level at a later stage.

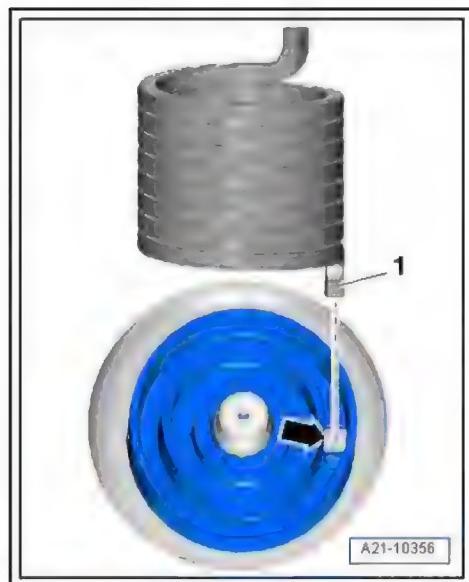
- Insert damper spring in damper element.
- End -1- of damper spring must engage in hole -arrow- in rear damper element.
- Apply a thin layer of sealant to sealing surface of drive unit.
- Fit drive unit to supercharger housing (pay attention to dowel sleeves).



Caution

Avoid damage to drive shaft.

- ◆ The drive unit must not be pulled in by screwing in the bolts.



- Simultaneously turn drive pulley until opposite end of damper spring engages in hole in drive unit.

Remaining installation steps are carried out in reverse sequence; note the following:

- Check supercharger for leaks ⇒ [page 263](#)
- Install coolant pipes on supercharger ⇒ [page 234](#).

Tightening torques

- ◆ ⇒ [“1.2 Exploded view - drive unit”, page 259](#)

1.6 Securing supercharger to engine and gearbox support

⇒ [“1.6.1 Securing supercharger to engine and gearbox support for assembly work”, page 268](#)

⇒ [“1.6.2 Securing supercharger to engine and gearbox support for leak test”, page 269](#)

1.6.1 Securing supercharger to engine and gearbox support for assembly work

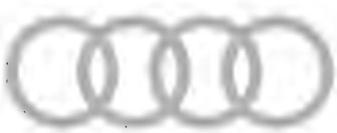


Note

When performing assembly work, the openings in the bottom of the supercharger housing make it possible for you to see and access the charge air coolers.

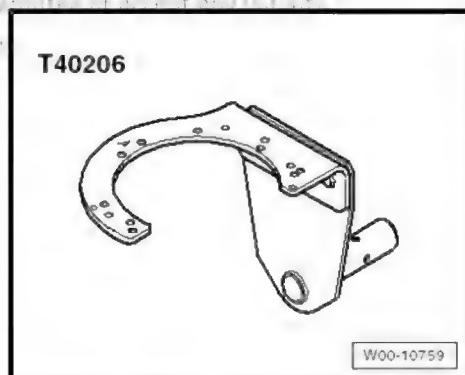
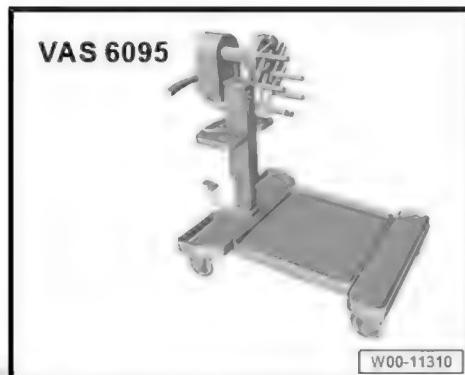
Special tools and workshop equipment required

- ◆ Engine and gearbox support - VAS 6095-



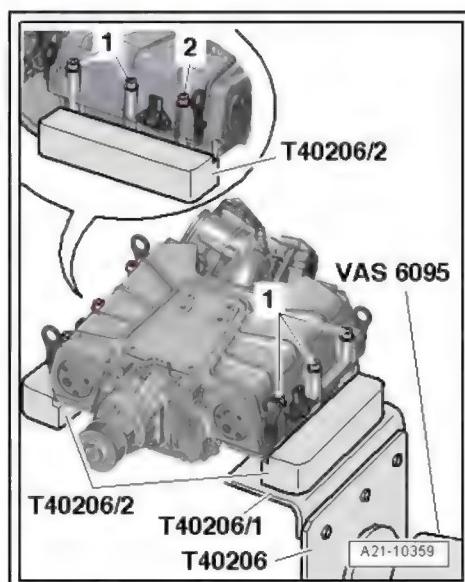
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- ◆ Gearbox support - T40206- with -T40206/1- and -T40206/2-



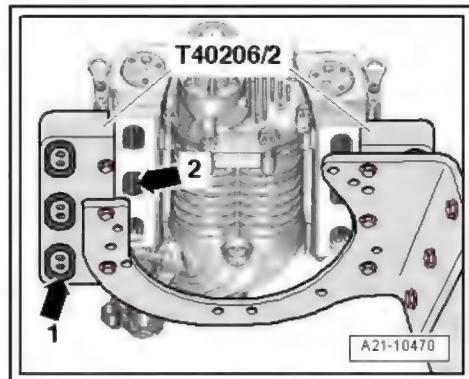
Procedure

- Supercharger removed [page 259](#).
- Insert gearbox support -T40206- with -T40206/1- into engine and gearbox support - VAS 6095- .
- Secure supercharger to gearbox support, as shown in illustration (use holes "1", "4", "9", "11" and "13" for bolted connections -1-).
- Attach mounting -T40206/2- directly to supercharger housing at front right with bolt -2-.



Installation position of mountings -T40206/2- :

- Seals -arrow 1- of mountings should point downwards.
- Openings -arrow 2- in supercharger housing make it possible for you to see and access charge air coolers.



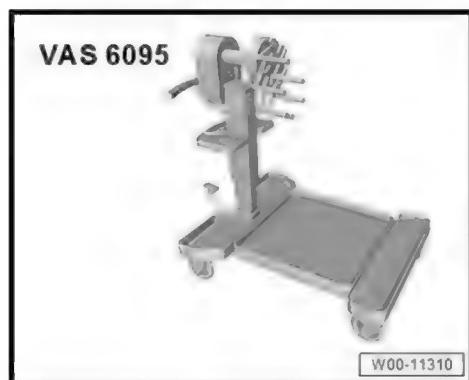
1.6.2 Securing supercharger to engine and gearbox support for leak test



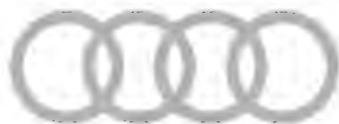
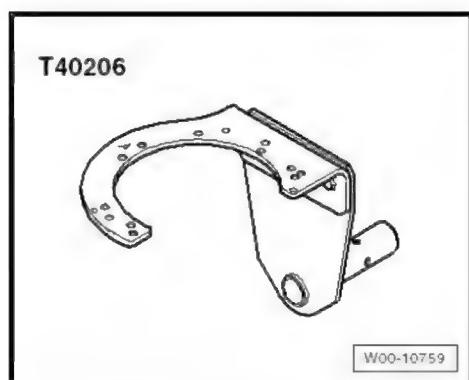
When checking for leaks, the seals on the mountings -T40206/2- should seal off the openings in the supercharger housing.

Special tools and workshop equipment required

- ◆ Engine and gearbox support - VAS 6095-

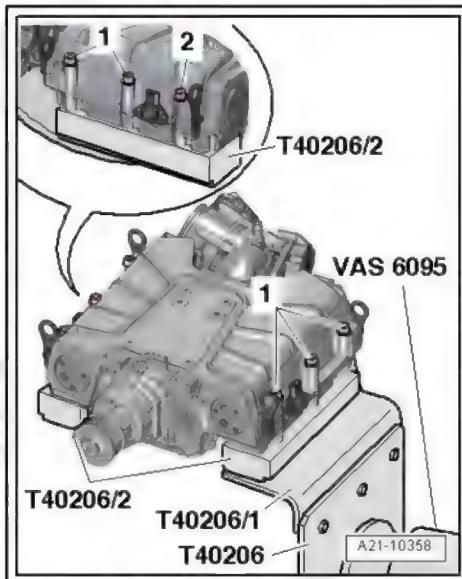


- ◆ Gearbox support - T40206- with -T40206/1- and -T40206/2-



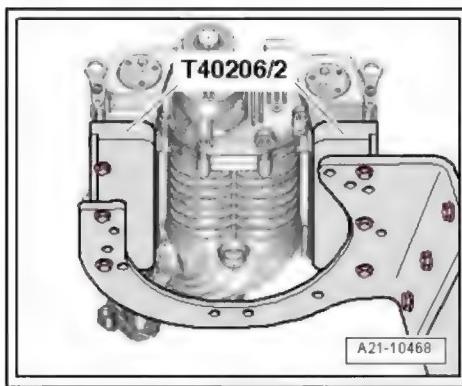
Procedure

- Supercharger removed [⇒ page 259](#).
- Insert gearbox support -T40206- with -T40206/1- into engine and gearbox support - VAS 6095-.
- Secure supercharger to gearbox support, as shown in illustration (use holes "1", "4", "9", "11" and "13" for bolted connections -1-).
- Attach mounting -T40206/2- directly to supercharger housing at front right with bolt -2-.



Installation position of mountings -T40206/2- :

- Seals of mountings should seal off openings in supercharger housing.



2 Charge air system

⇒ "2.1 Exploded view - charge air system", page 271

⇒ "2.3 Removing and installing charge air cooler", page 272

⇒ "2.4 Removing and installing charge pressure sender G31 / G447", page 275

2.1 Exploded view - charge air system



Note

- ◆ Observe rules for cleanliness ⇒ [page 5](#).
- ◆ Check that all air pipes and hoses and vacuum lines are correctly fitted and that there are no leaks before carrying out tests or repairs.

1 - Gasket

- Renew

2 - O-ring

- Renew

- Coat with engine oil when installing charge air cooler

3 - O-ring

- Renew

- Coat with engine oil when installing charge air cooler

4 - Supercharger housing

5 - Gasket

- Renew

6 - Charge air cooler (right-side)

- Removing and installing
⇒ "2.3 Removing and installing charge air cooler", page 272

7 - Bolt

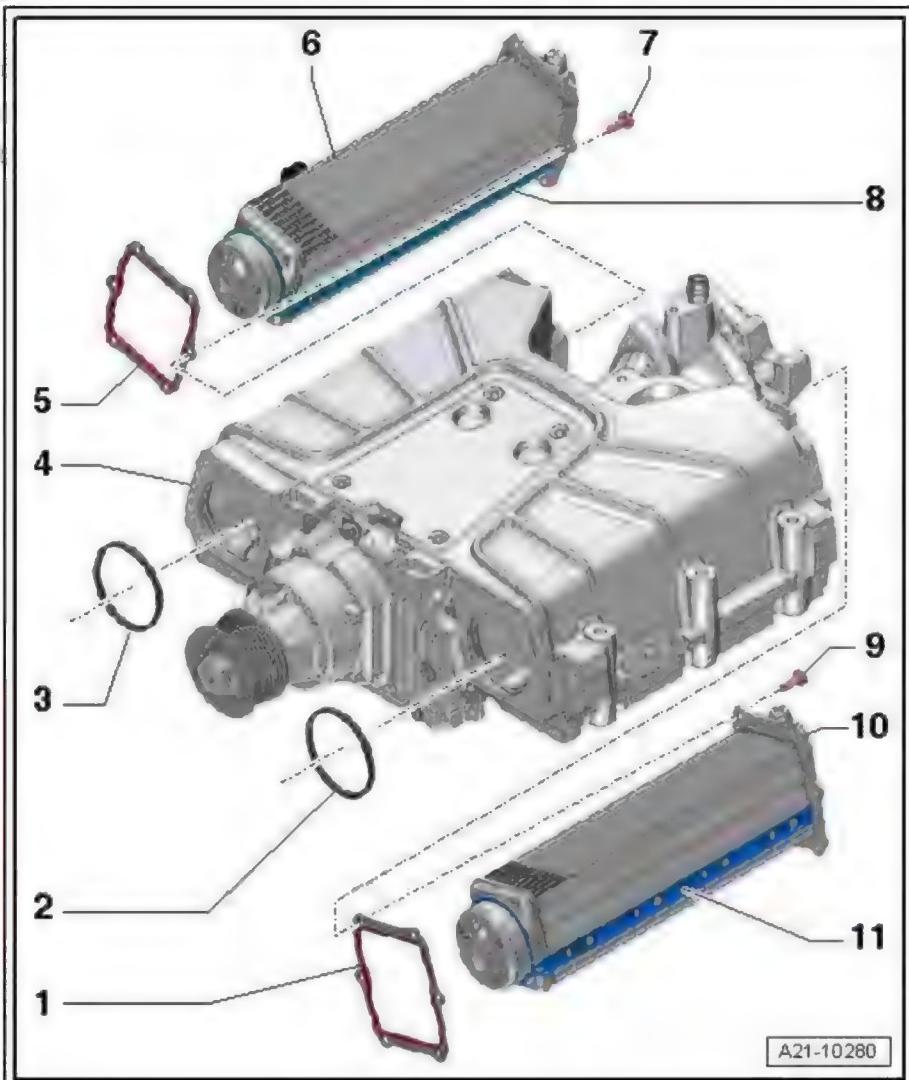
- Self-locking
- Renew
- 10 Nm

8 - Seal

- Not supplied separately
- Must not be detached from charge air cooler
- Coat with engine oil when installing charge air cooler

9 - Bolt

- Self-locking
- Renew



A21-10280

10 Nm

10 - Charge air cooler (left-side)

Removing and installing ⇒ [“2.3 Removing and installing charge air cooler”, page 272](#)

11 - Seal

- Not supplied separately
- Must not be detached from charge air cooler
- Coat with engine oil when installing charge air cooler

2.2 Exploded view - hose connections for charge air system



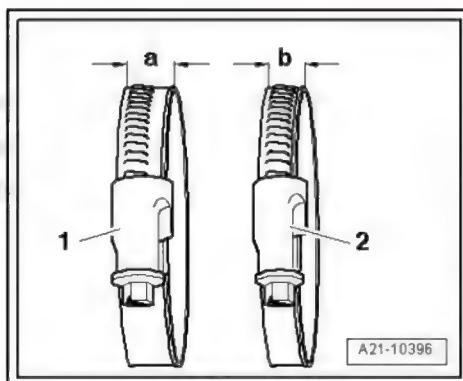
Note

- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *Secure all hose connections with the correct type of screw-type clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *The screw sections of used screw-type clips must be sprayed with rust remover prior to fitting so that the air hoses can be attached securely to the hose connections.*

Tightening torque for

1 - Screw-type clip -a- = 13 mm wide: 5.5 Nm

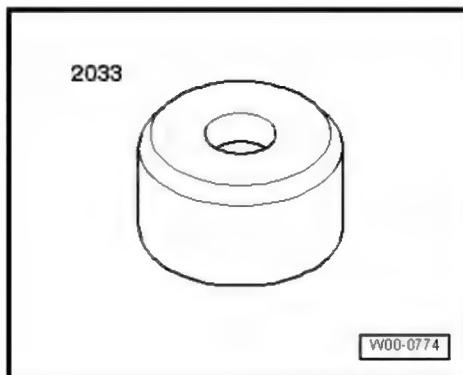
2 - Screw-type clip -b- = 9 mm wide: 3.4 Nm



2.3 Removing and installing charge air cooler

Special tools and workshop equipment required

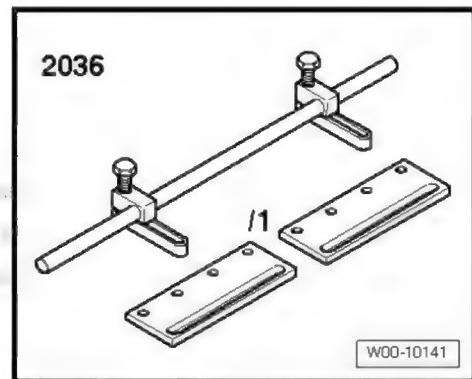
- ◆ Fitting sleeve - 2033-



◆ Assembly device for valves - 2036-



Important information: Caution! Do not damage the
 painted surfaces of tools used by AUDI AG. AUDI AG does
 not accept responsibility for damage to these surfaces.



◆ Tyre lever for aluminium rims - V.A.G 1942-

Removing

- Supercharger secured to engine and gearbox support - VAS 6095- for assembly work [⇒ page 268](#).

Charge air cooler (left-side):

- Unclip bracket -1- for vacuum hose.



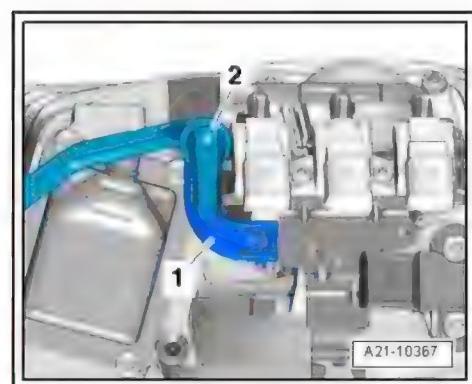
Note

Disregard -item 2-.

- Remove charge pressure sender 2 - G447- [⇒ page 275](#).

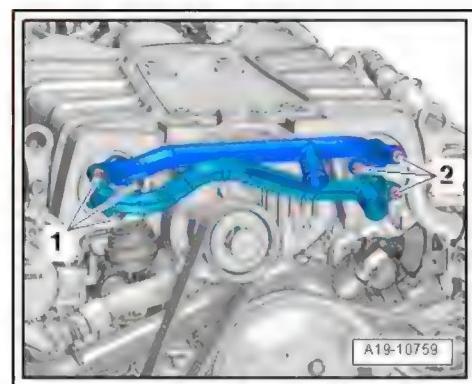
Charge air cooler (right-side):

- Remove throttle valve module - J338- [⇒ page 303](#).
- Remove charge pressure sender - G31- [⇒ page 275](#).

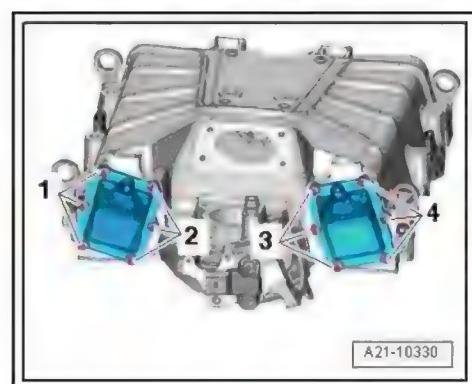


Both sides (continued):

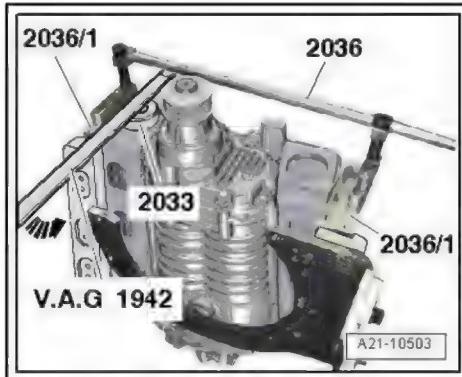
- Remove bolts -1- and -2- and detach coolant pipes from supercharger.



- Remove bolts -1, 2- for charge air cooler (left-side) and bolts -3, 4- for charge air cooler (right-side).



- Attach valve assembly device - 2036- with -2036/1- to supercharger, as shown in illustration.
- Apply fitting sleeve - 2033- at front of charge air cooler.
- Using tyre lever - V.A.G 1942-, apply moderate pressure and slowly press charge air cooler out of supercharger housing.

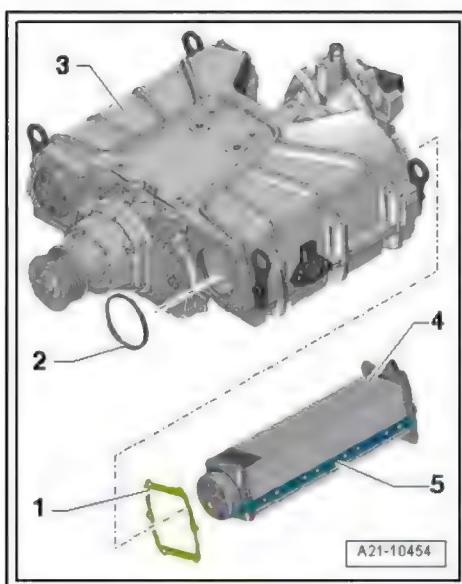


Installing

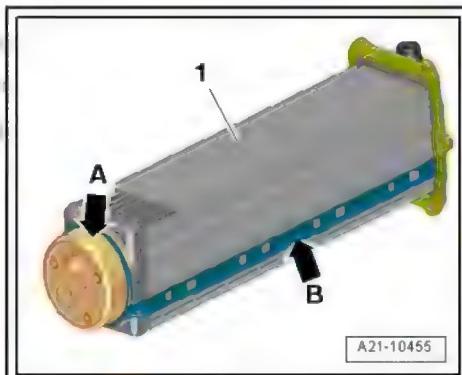


Note

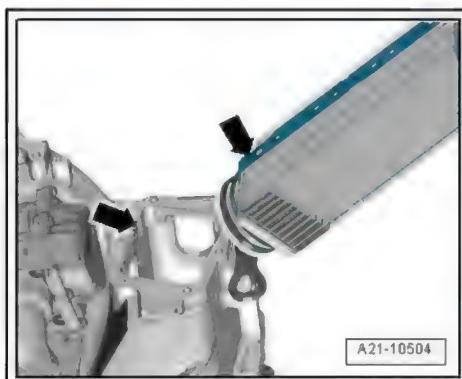
- ◆ Renew seals, gaskets, O-rings and self-locking bolts.
- ◆ Before assembly, always remove residues from threaded holes in supercharger housing using a thread tap.
- Check gasket -5- on charge air cooler -4-.
- The gasket must not be cracked or damaged.
- Slide gasket -1- onto charge air cooler.
- Insert O-ring -2- into opening in supercharger housing -3-.



- Coat sealing surface -arrow A- and gasket -arrow B- of charge air cooler -1- with engine oil.
- Also coat sealing surface inside supercharger housing with engine oil.



- When fitting charge air cooler, make sure that seals align with recesses in supercharger housing -arrows-.





Note

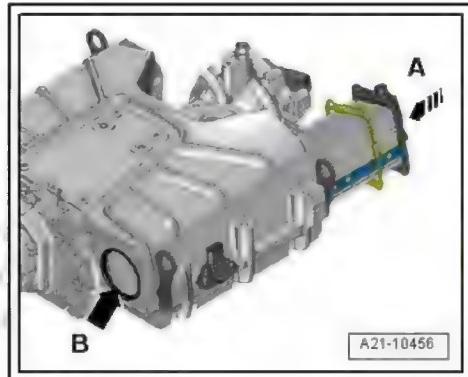
To make it easier to insert and press in the charge air cooler, position the supercharger housing vertically in engine and gearbox support - VAS 6095- .



Caution

Risk of damage to charge air cooler.

- ◆ Only insert charge air cooler by hand.



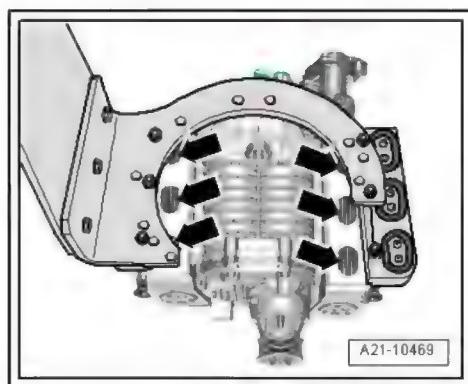
- Insert charge air cooler in supercharger housing -arrow A- by hand as far as stop, letting charge air cooler slide into hole -arrow B- in front of supercharger housing.
- If necessary, guide charge air cooler by hand via openings -arrows- in supercharger housing when inserting cooler.
- As soon as possible (due to length of bolts), screw in 2 bolts loosely by hand to guide charge air cooler additionally.



Caution

Risk of damage to charge air cooler.

- ◆ The charge air cooler must not be pulled in by screwing in the securing bolts.
- ◆ Insert charge air cooler by hand (without using tools) until sealing flange with gasket makes contact with supercharger housing (maximum: 1 mm distance). Only then tighten bolts, as described in the following.



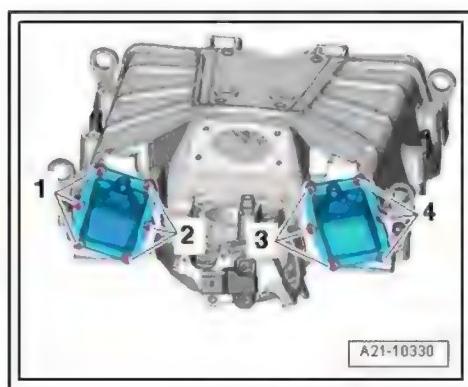
- Tighten bolts -1, 2- for charge air cooler (left-side) and bolts -3, 4- for charge air cooler (right-side) in diagonal sequence and in small steps.

Remaining installation steps are carried out in reverse sequence; note the following:

- Install coolant pipes on supercharger [⇒ page 234](#) .
- Install throttle valve module - J338- [⇒ page 303](#) .
- Check supercharger for leaks [⇒ page 263](#) .

Tightening torques

- ◆ [⇒ “2.1 Exploded view - charge air system”, page 271](#)

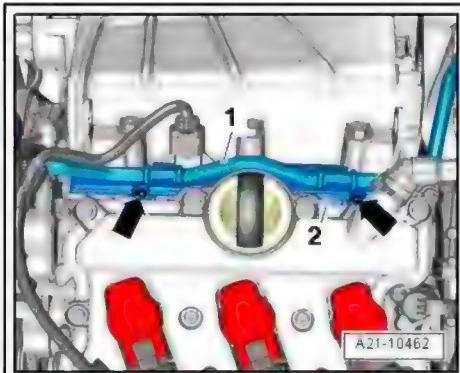


2.4 Removing and installing charge pressure sender -G31- / -G447-

Removing

Cylinder bank 2 (left-side):

- Move clear vacuum hose -1-.
- Remove bolts -arrows- and detach cover -2-.



Both sides (continued):

- Unplug electrical connector -1-.
- Unscrew bolts -arrows- and remove charge pressure sender.

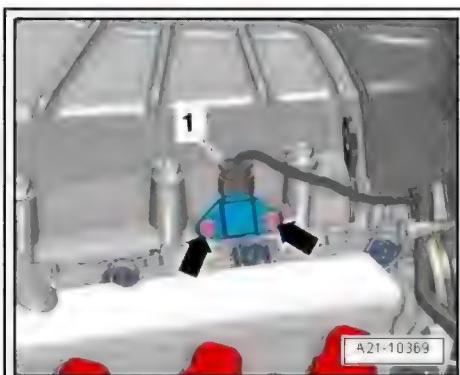
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ *Renew self-locking bolts and O-ring.*
- ◆ *Before assembly, always remove residues from threaded holes for charge pressure senders in supercharger housing using a thread tap.*



Tightening torques

- ◆ [⇒ "1.1 Exploded view - supercharger", page 257](#)

24 – Mixture preparation - injection

1 Injection system

⇒ "1.1 Overview of fitting locations - injection system", page 277

⇒ "1.2 Checking fuel system for leaks", page 287

1.1 Overview of fitting locations - injection system

Engine compartment (right-side)

1 - Secondary air pump motor
- V101-

- Fitting location ⇒ Fig. "Fitting location of secondary air pump motor - V101-", page 287

2 - Charge pressure sender - G31- / intake manifold temperature sender - G72-

- Fitting location ⇒ Fig. "Fitting location of charge pressure sender -G31- / intake manifold temperature sender - G72-", page 284

3 - Ignition coils, cylinder bank 1
permitted unless authorised

- Ignition coil 1 with output stage - N70-
- Ignition coil 2 with output stage - N127-
- Ignition coil 3 with output stage - N291-
- Removing and installing ⇒ "1.3 Removing and installing ignition coils with output stages", page 363

4 - Lambda probe - G39-

- With Lambda probe heater - Z19-
- Fitting location ⇒ Fig. "Fitting location of Lambda probes on cylinder bank 1 (right-side)", page 282

- Fitting location of connector ⇒ Fig. "Electrical connectors at rear right of engine", page 281

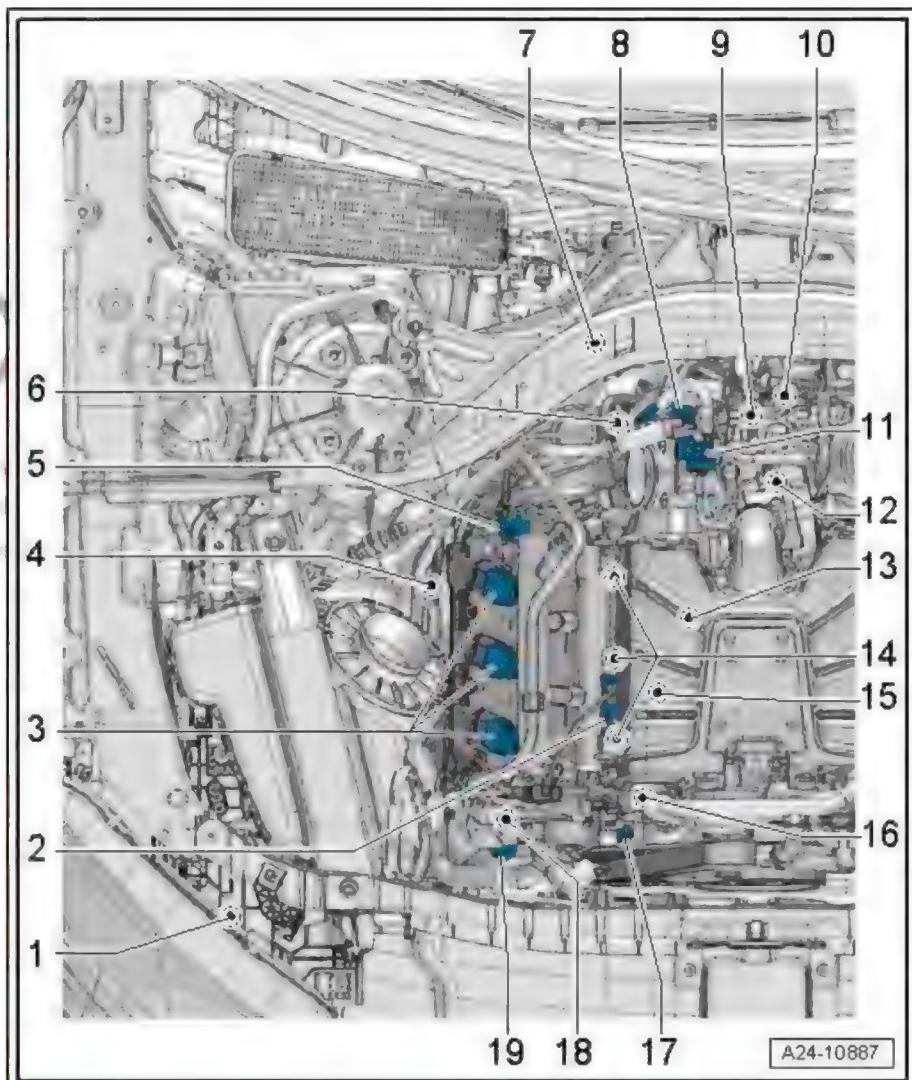
- Removing and installing ⇒ "8.2.1 Removing and installing Lambda probe G39 / Lambda probe after catalytic converter G130", page 319

5 - Camshaft control valve 1 - N205-

- Fitting location ⇒ Fig. "Fitting location of Hall sender and camshaft control valve on cylinder bank 1 (right-side)", page 285

6 - Electrical connectors

- Assignment of connectors ⇒ Fig. "Electrical connectors at rear left of engine", page 282



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7 - Lambda probe after catalytic converter - G130-

- With Lambda probe 1 heater after catalytic converter - Z29-
- Fitting location [⇒ Fig. "Fitting location of Lambda probes on cylinder bank 1 \(right-side\)"](#), page 282
- Fitting location of connector [⇒ Fig. "Electrical connectors at rear right of engine"](#), page 281
- Removing and installing [⇒ "8.2.1 Removing and installing Lambda probe G39 / Lambda probe after catalytic converter G130"](#), page 319

8 - Throttle valve module - J338-

- Fitting location [⇒ Fig. "Fitting location of throttle valve module -J338-](#), page 283
- Removing and installing [⇒ "4.3 Removing and installing throttle valve module J338"](#), page 303

9 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

- Fitting location [⇒ Fig. "Fitting location of intake air temperature sender -G42- / intake manifold pressure sender -G71-](#), page 284
- Removing and installing [⇒ "6.1 Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71"](#), page 311

10 - Sender 1 for secondary air pressure - G609-

- USA version only
- Fitting location [⇒ Fig. "Fitting location of sender 1 for secondary air pressure -G609-](#), page 287

11 - Activated charcoal filter solenoid valve 1 - N80-

12 - Engine speed sender - G28-

- Fitting location [⇒ Fig. "Fitting location of engine speed sender -G28-](#), page 286
- Removing and installing [⇒ "1.6 Removing and installing engine speed sender G28"](#), page 367

13 - Knock sensor 1 - G61-

- Fitting location [⇒ Fig. "Fitting locations below intake manifold \(bottom section\) on cylinder bank 1 \(right-side\)"](#), page 283
- Fitting location of connector [⇒ Fig. "Electrical connectors at rear right of engine"](#), page 281

14 - Injectors, cylinder bank 1

- Injector, cylinder 1 - N30-
- Injector, cylinder 2 - N31-
- Injector, cylinder 3 - N32-
- Removing and installing [⇒ "5.1 Removing and installing injectors"](#), page 306

15 - Temperature sender for engine temperature regulation - G694-

- Fitting location [⇒ Fig. "Fitting location of temperature sender for engine temperature regulation -G694-](#), page 283

16 - Intake manifold flap potentiometer - G336-

- Fitting location [⇒ Fig. "Fitting location of intake manifold flap potentiometer -G336-](#), page 284

17 - Hall sender - G40-

- Fitting location [⇒ Fig. "Fitting location of Hall sender and camshaft control valve on cylinder bank 1 \(right-side\)"](#), page 285

18 - Fuel metering valve - N290-

- Fitting location [⇒ Fig. "Fitting locations at high-pressure pump"](#), page 282

19 - Fuel pressure sender for low pressure - G410-

- Fitting location [⇒ Fig. "Fitting locations at high-pressure pump"](#), page 282

Engine compartment (left-side)

1 - Intake manifold flap potentiometer 2 - G512-

- Fitting location ⇒ Fig. ["Fitting location of intake manifold flap potentiometer -G336- "" , page 284](#)

2 - Coolant temperature sender - G62-

- Fitting location ⇒ Fig. ["Fitting location of coolant temperature sender -G62- "" , page 285](#)

3 - Fuel pressure sender - G247-

- Fitting location ⇒ Fig. ["Fitting locations below intake manifold \(bottom section\) on cylinder bank 2 \(left-side\)" , page 283](#)
- Lubricate threads
- 22 Nm

4 - Knock sensor 2 - G66-

- Fitting location ⇒ Fig. ["Fitting locations below intake manifold \(bottom section\) on cylinder bank 2 \(left-side\)" , page 283](#)
- Fitting location of connector ⇒ Fig. ["Electrical connectors at rear left of engine" , page 282](#)

5 - Injectors, cylinder bank 2

- Injector, cylinder 4 - N33-
- Injector, cylinder 5 - N83-
- Injector, cylinder 6 - N84-

Removing and installing ⇒ ["5.1 Removing and installing injectors" , page 306](#)

6 - Regulating flap control unit - J808-

- Fitting location ⇒ Fig. ["Fitting location of regulating flap control unit J808- "" , page 284](#)
- Removing and installing ⇒ ["4.5 Removing and installing regulating flap control unit J808 " , page 305](#)

7 - Secondary air inlet valve - N112-

- Fitting location ⇒ Fig. ["Fitting location of secondary air inlet valves and intake manifold flap valve -N316- "" , page 286](#)

8 - Intake manifold flap valve - N316-

- Fitting location ⇒ Fig. ["Fitting location of secondary air inlet valves and intake manifold flap valve -N316- "" , page 286](#)

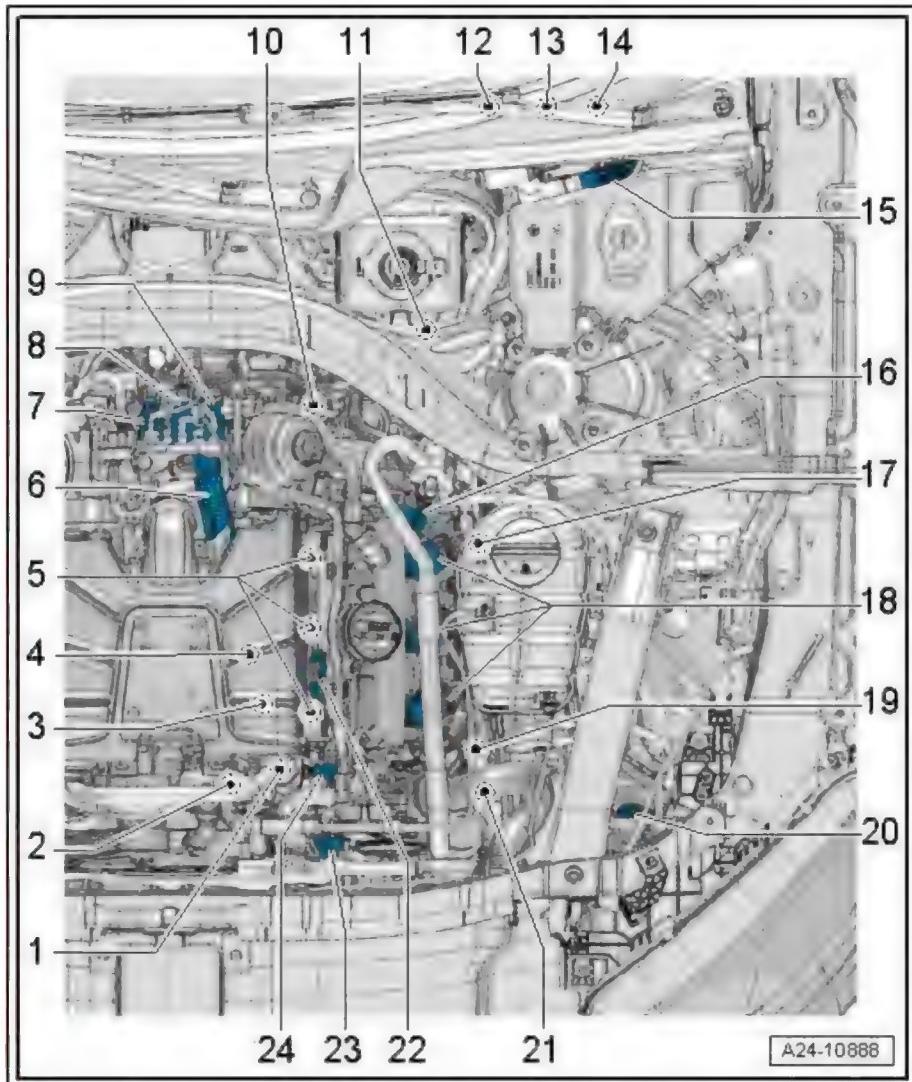
9 - Secondary air inlet valve 2 - N320-

- Fitting location ⇒ Fig. ["Fitting location of secondary air inlet valves and intake manifold flap valve -N316- "" , page 286](#)

10 - Electrical connectors

- Assignment of connectors ⇒ Fig. ["Electrical connectors at rear left of engine" , page 282](#)

11 - Lambda probe 2 after catalytic converter - G131-



A24-10888

- With Lambda probe 2 heater after catalytic converter - Z30-
- Fitting location [⇒ Fig. “Fitting location of Lambda probes on cylinder bank 2 \(left-side\)”](#), page 282
- Fitting location of connector [⇒ Fig. “Electrical connectors at rear left of engine”](#), page 282
- Removing and installing [⇒ “8.2.2 Removing and installing Lambda probe 2 G108 / Lambda probe 2 after catalytic converter G131”](#), page 320

12 - Engine fault warning lamp

- In instrument cluster

13 - Accelerator position sender - G79- / accelerator position sender 2 - G185-

- In accelerator pedal module; fitting location [⇒ Fig. “Fitting location of accelerator position sender -G79- / accelerator position sender 2 -G185-”](#), page 281

14 - Brake light switch - F-

- Fitting location [⇒ Fig. “Fitting location of brake light switch -F-”](#), page 281

15 - Engine control unit - J623-

- Fitting location [⇒ Fig. “Fitting location of engine control unit -J623-”](#), page 281
- Removing and installing [⇒ “9.2 Removing and installing engine/motor control unit J623”](#), page 324

16 - Camshaft control valve 2 - N208-

Fitting location [⇒ Fig. “Fitting location of Hall sender and camshaft control valve on cylinder bank 2 \(left-side\)”](#), page 285

17 - Lambda probe 2 - G108-

- With Lambda probe heater 2 - Z28-
- Fitting location [⇒ Fig. “Fitting location of Lambda probes on cylinder bank 2 \(left-side\)”](#), page 282
- Fitting location of connector [⇒ Fig. “Electrical connectors at rear left of engine”](#), page 282
- Removing and installing [⇒ “8.2.2 Removing and installing Lambda probe 2 G108 / Lambda probe 2 after catalytic converter G131”](#), page 320

18 - Ignition coils, cylinder bank 2

- Ignition coil 4 with output stage - N292-
- Ignition coil 5 with output stage - N323-
- Ignition coil 6 with output stage - N324-
- Removing and installing [⇒ “1.3 Removing and installing ignition coils with output stages”](#), page 363

19 - Valve for oil pressure control - N428-

- Fitting location [⇒ Fig. “Fitting location of valve for oil pressure control -N428-”](#), page 285

20 - Charge air cooling pump - V188-

- Fitting location [⇒ Fig. “Fitting location of charge air cooling pump -V188-”](#), page 286

21 - Continued coolant circulation pump - V51-

- Equipment version or country-specific version
- Fitting location [⇒ Fig. “Fitting location of continued coolant circulation pump -V51-”](#), page 286

22 - Intake manifold temperature sender 2 - G430- / charge pressure sender 2 - G447-

- Fitting location [⇒ Fig. “Fitting location of charge pressure sender -G31- / intake manifold temperature sender -G72-”](#), page 284

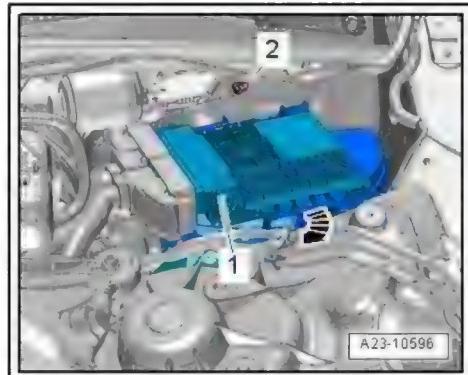
23 - Coolant valve for cylinder head - N489-

24 - Hall sender 2 - G163-

- Fitting location [⇒ Fig. “Fitting location of Hall sender and camshaft control valve on cylinder bank 2 \(left-side\)”](#), page 285

Fitting location of engine control unit - J623-

- ◆ -Item 1- in plenum chamber (left-side)



A23-10596

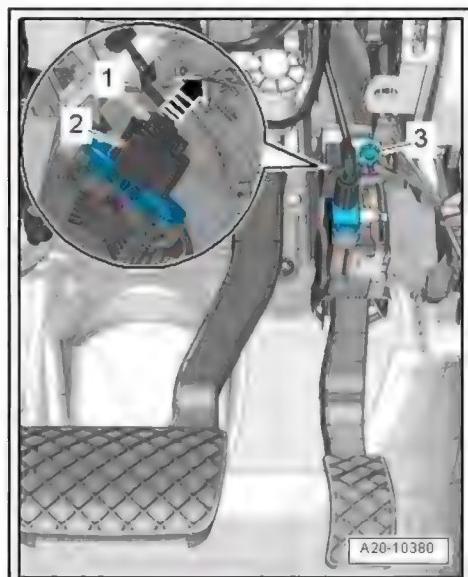
Fitting location of accelerator position sender - G79- / accelerator position sender 2 - G185-

- ◆ In accelerator pedal module



The accelerator position sender - G79- and accelerator position sender 2 - G185- are integrated in the accelerator pedal module and cannot be renewed individually.

Removing and installing ⇒ Fuel supply system, diesel engines; Rep. gr. 20 ; Accelerator mechanism; Removing and installing accelerator pedal module with accelerator position sender -G79- / -G185- .



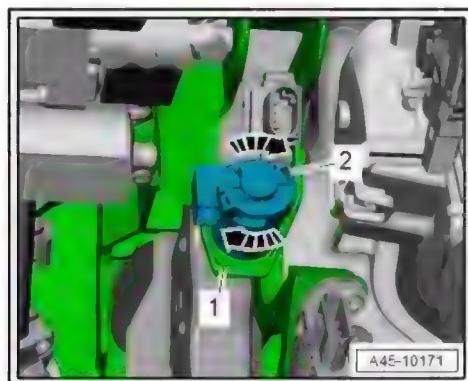
A20-10380

Fitting location of brake light switch - F-

- ◆ In footwell on brake pedal

2 - Brake light switch - F-

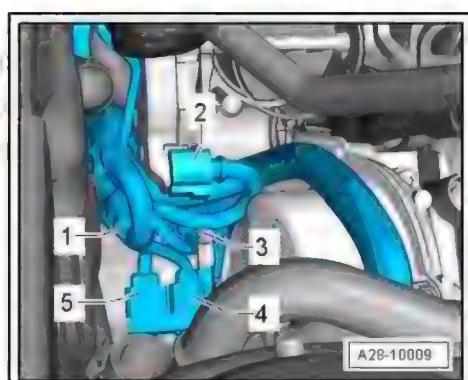
Removing and installing ⇒ Brake system; Rep. gr. 45 ; Sensors; Removing and installing brake light switch



A4E-10171

Electrical connectors at rear right of engine

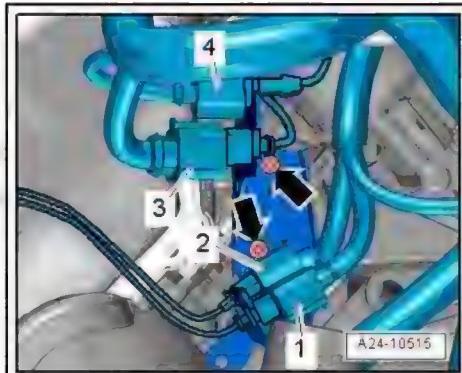
- 1 - For injectors on cylinder bank 1
- 2 - For throttle valve module - J338-
- 3 - For knock sensor 1 - G61-
- 4 - For Lambda probe - G39- with Lambda probe heater - Z19-
- 5 - For Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-



A2B-10009

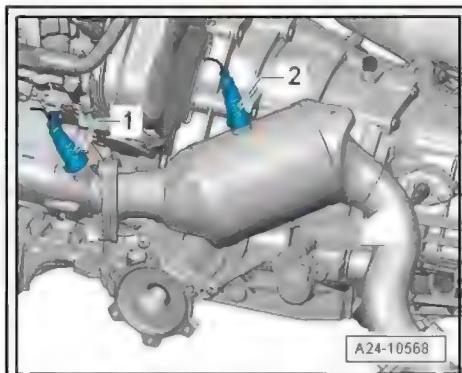
Electrical connectors at rear left of engine

- 1 - For Lambda probe 2 after catalytic converter - G131- with Lambda probe 2 heater after catalytic converter - Z30-
Protected by copyright. Copying for private or commercial purposes, on in part, is prohibited.
- 2 - For Lambda probe 2 - G108- with Lambda probe heater 2 - Z28-
- 3 - For injectors on cylinder bank 2 and for fuel pressure sender - G247-
- 4 - To knock sensor 2 - G66-



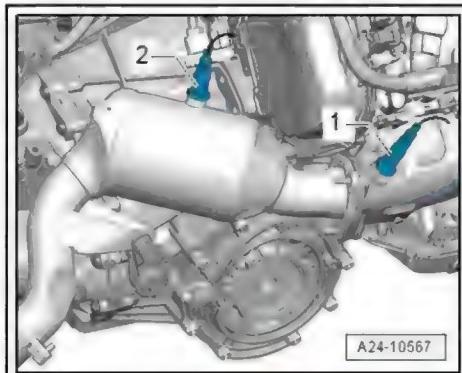
Fitting location of Lambda probes on cylinder bank 1 (right-side)

- 1 - Lambda probe - G39- with Lambda probe heater - Z19-
- 2 - Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-



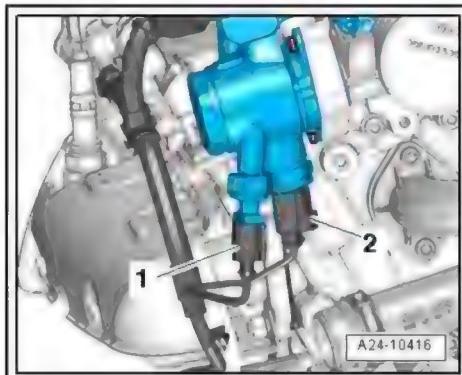
Fitting location of Lambda probes on cylinder bank 2 (left-side)

- 1 - Lambda probe 2 - G108- with Lambda probe heater 2 - Z28-
- 2 - Lambda probe 2 after catalytic converter - G131- with Lambda probe 2 heater after catalytic converter - Z30-



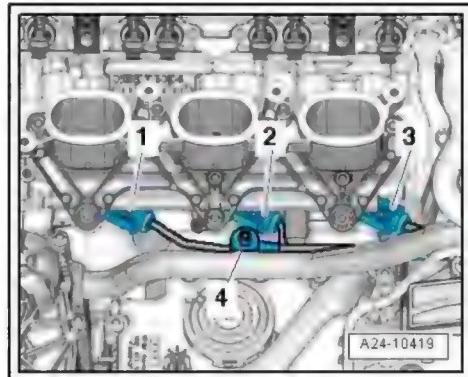
Fitting locations at high-pressure pump

- ◆ On right side of cylinder head
- 1 - Fuel pressure sender for low pressure - G410-
 - 2 - Fuel metering valve - N290-



Fitting locations below intake manifold (bottom section) on cylinder bank 1 (right-side)

- 1 - Injector, cylinder 1 - N30-
- 2 - Injector, cylinder 2 - N31-
- 3 - Injector, cylinder 3 - N32-
- 4 - Knock sensor 1 - G61-



Fitting location of temperature sender for engine temperature regulation - G694-

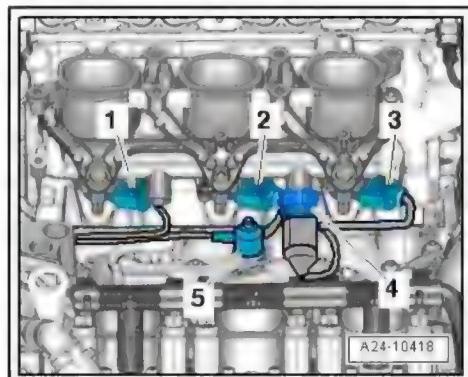
- ◆ -Item 1- below intake manifold (bottom section) on cylinder bank 1 (right-side)

Removing and installing [page 218](#)
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 correctness of information in this document. Copyright



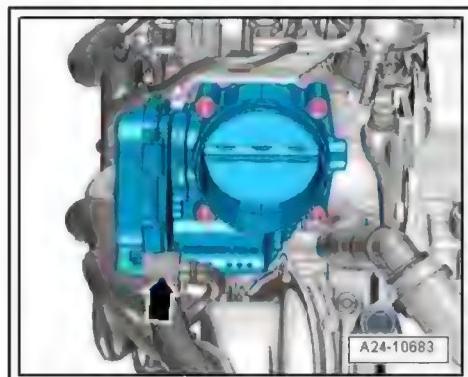
Fitting locations below intake manifold (bottom section) on cylinder bank 2 (left-side)

- 1 - Injector, cylinder 6 - N84-
- 2 - Injector, cylinder 5 - N83-
- 3 - Injector, cylinder 4 - N33-
- 4 - Fuel pressure sender - G247-
- 5 - Knock sensor 2 - G66-



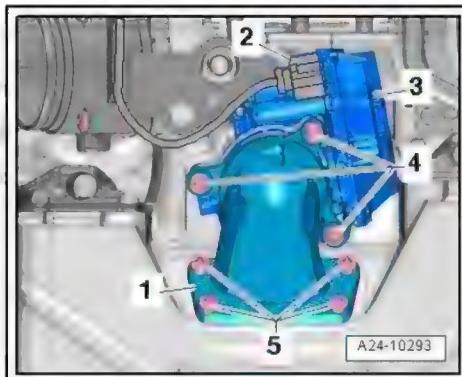
Fitting location of throttle valve module - J338-

- ◆ At rear of supercharger



Fitting location of regulating flap control unit - J808-

- ◆ -Item 3- at rear of supercharger



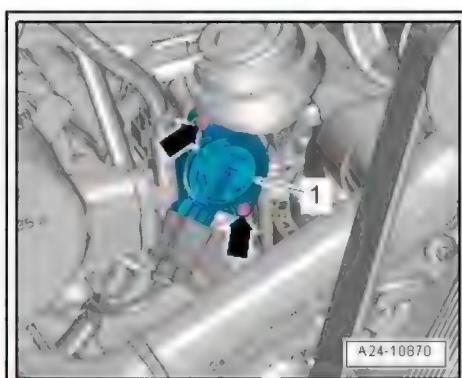
Fitting location of intake manifold flap potentiometer - G336-

- ◆ -Item 1- at front of intake manifold (right-side)



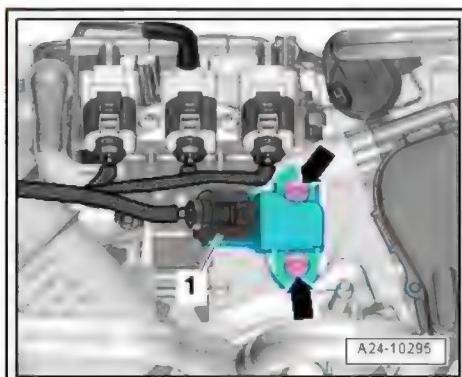
The fitting location of the intake manifold flap potentiometer 2 - G512- is symmetrically reversed.

- Removing and installing ⇒ ["2.3 Removing and installing vacuum unit for actuating intake manifold flaps"](#), page 290



Fitting location of intake air temperature sender - G42- / intake manifold pressure sender - G71-

- ◆ At rear of supercharger with charge air cooler
- 1 - Electrical connector for intake air temperature sender - G42- / intake manifold pressure sender - G71-



Fitting location of charge pressure sender - G31- / intake manifold temperature sender - G72-

- ◆ At right side of supercharger with charge air cooler
- 1 - Electrical connector for charge pressure sender - G31- / intake manifold temperature sender - G72-



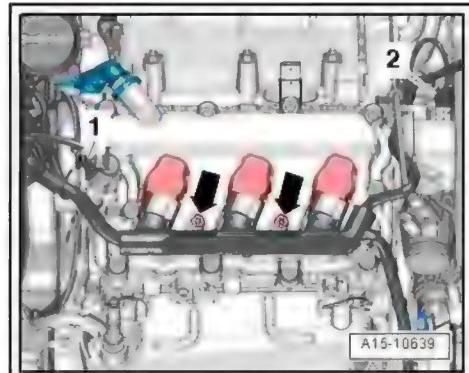
Intake manifold temperature sender 2 - G430- / charge pressure sender 2 - G447- are located symmetrically reversed.



Removing and installing ⇒ [page 275](#)

Fitting location of Hall sender and camshaft control valve on cylinder bank 1 (right-side)

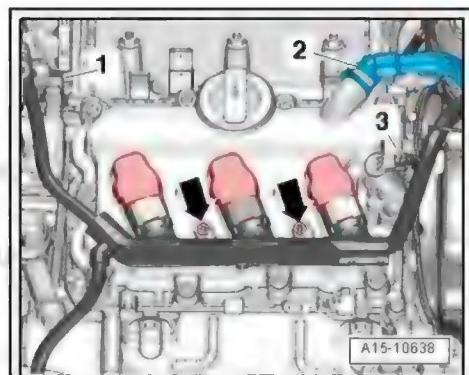
- 1 - Camshaft control valve 1 - N205-
- 2 - Hall sender - G40-



Fitting location of Hall sender and camshaft control valve on cylinder bank 2 (left-side)

- 1 - Hall sender 2 - G163-
- 2 - Camshaft control valve 2 - N208-

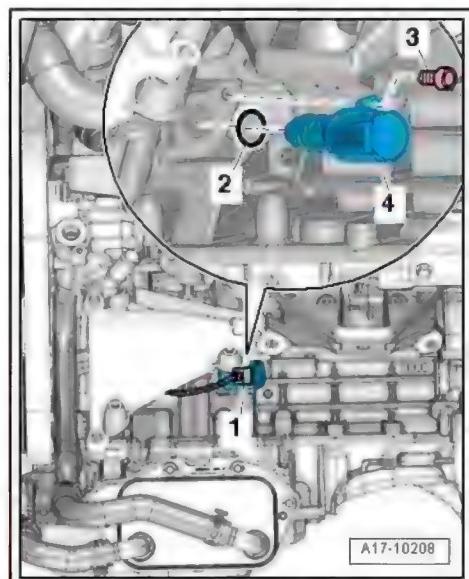
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Fitting location of valve for oil pressure control - N428-

- ◆ -Item 4- at bottom left of engine

Removing and installing [⇒ page 198](#)

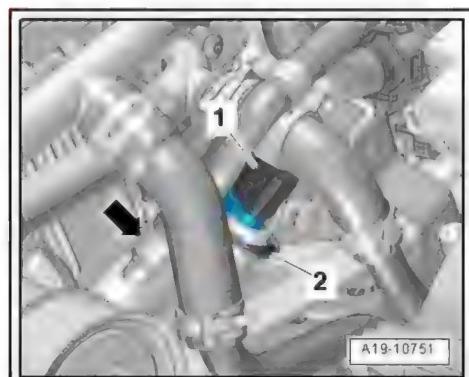


Fitting location of coolant temperature sender - G62-

- ◆ At front of engine

1 - Electrical connector for coolant temperature sender - G62-

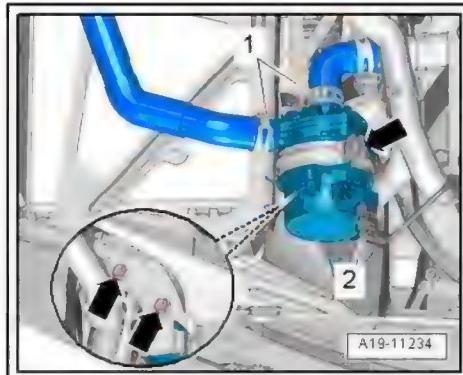
Removing and installing [⇒ page 217](#)



Fitting location of charge air cooling pump - V188-

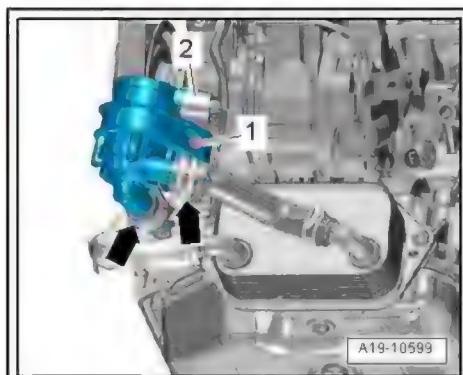
- ◆ In wheel housing (front left)
- 2 - Electrical connector for charge air cooling pump - V188-

Removing and installing [⇒ page 214](#)



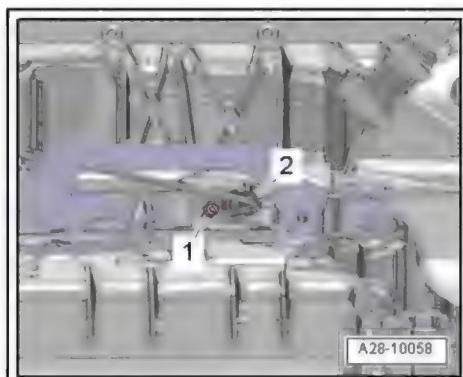
Fitting location of continued coolant circulation pump - V51-

- ◆ At front left of engine
- 2 - Electrical connector for continued coolant circulation pump - V51-



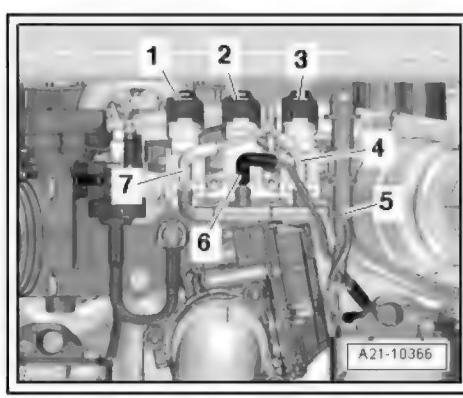
Fitting location of engine speed sender - G28-

- ◆ At bottom of timing chain cover (bottom)
- 2 - Electrical connector for engine speed sender - G28-



Fitting location of secondary air inlet valves and intake manifold flap valve - N316-

- ◆ At rear of supercharger with charge air cooler
- 1 - Secondary air inlet valve - N112-
- 2 - Intake manifold flap valve - N316-
- 3 - Secondary air inlet valve 2 - N320-



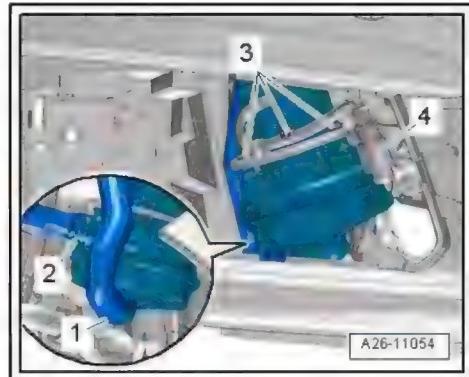
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Fitting location of secondary air pump motor - V101-

- ◆ In wheel housing (front right)

4 - Electrical connector for secondary air pump motor - V101-

Removing and installing [⇒ page 346](#)

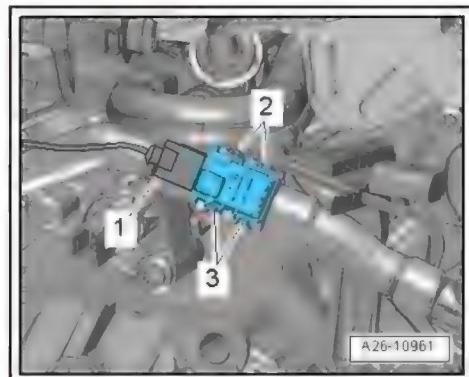


Fitting location of sender 1 for secondary air pressure - G609-

- ◆ At rear of engine

1 - Electrical connector for sender 1 for secondary air pressure
- G609-

Removing and installing [⇒ page 353](#)



1.2 Checking fuel system for leaks

Allow engine to run for several minutes at moderate rpm. Switch off ignition.

- Check complete fuel system for leaks.
- If leaks are found although the connections have been tightened to the correct torque, the relevant component must be renewed.
- Road-test vehicle and accelerate with full throttle at least once.
- Then check high-pressure system again for leaks.

2 Vacuum system

- ⇒ [“2.1 Connection diagram - vacuum system”, page 288](#)
- ⇒ [“2.2 Checking vacuum system”, page 289](#)
- ⇒ [“2.3 Removing and installing vacuum unit for actuating intake manifold flaps”, page 290](#)

2.1 Connection diagram - vacuum system



Note

- ◆ Observe rules for cleanliness ⇒ [“3.1 Rules for cleanliness”, page 5](#).
- ◆ Check that all air pipes and hoses and vacuum lines are correctly fitted and that there are no leaks before carrying out tests or repairs.



Caution

Risk of engine malfunctions

- ◆ When routing vacuum lines, make sure they are not kinked, twisted or crushed.



Note

- ◆ Red = Vacuum supply line
- ◆ Blue = Control pipe to vacuum unit for actuating intake manifold flaps
- ◆ Orange = Control pipe to combination valve for secondary air system (left-side)
- ◆ Brown = Control pipe to combination valve for secondary air system (right-side)
- ◆ Green = Control pipe to switchable coolant pump

1 - Secondary air inlet valve - N112-

2 - Intake manifold flap valve - N316-

3 - Secondary air inlet valve 2 - N320-



Not fitted on some USA

4 - To brake servo

5 - Connecting piece with sealing cap

6 - Combination valve for secondary air system (left-side)

- Checking ⇒ ["3.3 Checking combination valve", page 347](#)

7 - Non-return valve

8 - Vacuum pump

9 - Coolant valve for cylinder head - N489-

10 - Vacuum unit

- For intake manifold flap on cylinder bank 2 (left-side)
- Removing and installing ⇒ ["2.3.2 Removing and installing vacuum unit for actuating intake manifold flaps, cylinder bank 2 \(left-side\)", page 292](#)

11 - Coolant pump

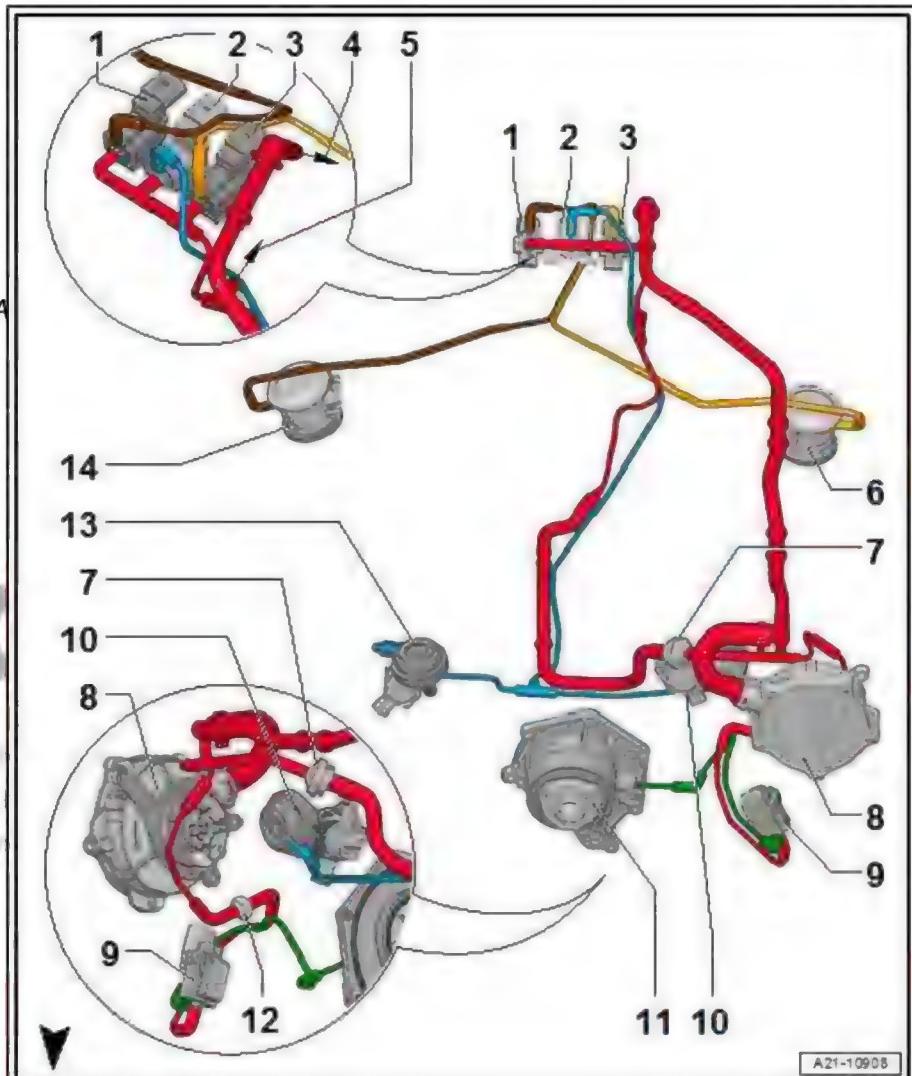
12 - Non-return valve

13 - Vacuum unit

- For intake manifold flap on cylinder bank 1 (right-side)
- Removing and installing ⇒ ["2.3.1 Removing and installing vacuum unit for actuating intake manifold flaps, cylinder bank 1 \(right-side\)", page 290](#)

14 - Combination valve for secondary air system (right-side)

- Checking ⇒ ["3.3 Checking combination valve", page 347](#)



A21-10908

2.2 Checking vacuum system

Special tools and workshop equipment required

- ◆ Hand vacuum pump - VAS 6213-



Procedure

- Check all vacuum lines in the complete vacuum system for:
 - ◆ Cracks
 - ◆ Traces of animal bites
 - ◆ Kinked or crushed lines
 - ◆ Porous or leaking lines
- Check vacuum line to solenoid valve and from solenoid valve to corresponding component.
- If an entry is stored in the event memory, check the vacuum lines leading to the corresponding component and also check the other vacuum lines leading to other components.
- If it is not possible to build up a vacuum with the hand vacuum pump - VAS 6213- or if the vacuum pressure drops again immediately, check the hand vacuum pump and connecting hoses for leaks.

2.3 Removing and installing vacuum unit for actuating intake manifold flaps

⇒ "2.3.1 Removing and installing vacuum unit for actuating intake manifold flaps, cylinder bank 1 (right-side)", page 290

⇒ "2.3.2 Removing and installing vacuum unit for actuating intake manifold flaps, cylinder bank 2 (left-side)", page 292

2.3.1 Removing and installing vacuum unit for actuating intake manifold flaps, cylinder bank 1 (right-side)

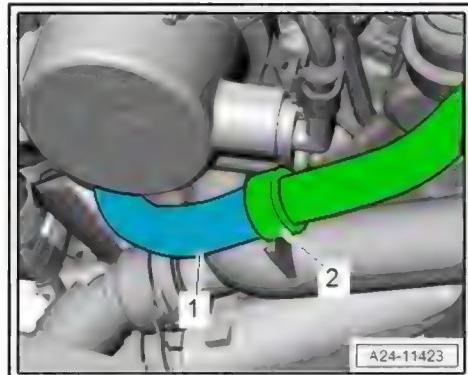
Special tools and workshop equipment required

- ◆ Torx wrench or bit 10 with ball head (commercially available)
- ◆ Magnetic rod (commercially available)

Removing

- Remove engine cover panels ⇒ [page 67](#).

- Disconnect secondary air hose -1- at connection point -2- and move clear at retainer.

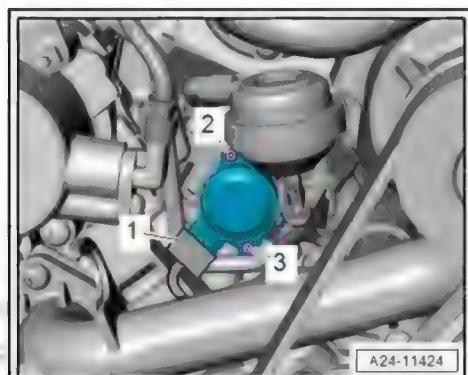


- Remove bolts -2, 3- and detach intake manifold flap potentiometer - G336- .



Illustration by courtesy: Copyright © 2011 by AUDI AG. AUDI AG does not accept responsibility for the correctness of information contained in this document. The contents of this document are not binding.

- Unclip operating rod -2- of vacuum unit from ball head.
- Disconnect vacuum hose -1- and detach vacuum unit.



Installing

Installation is carried out in reverse order; note the following:

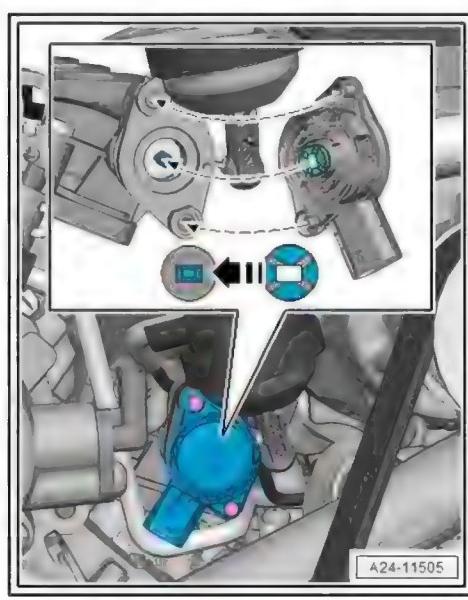
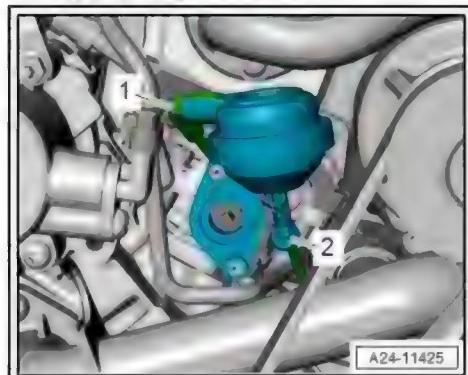
The shaft for the intake manifold flaps on the intake manifold (bottom section) and the mounting on the intake manifold flap potentiometer 2 - G512- are rectangular.

- Ensure that mounting on intake manifold flap potentiometer - G336- is correctly positioned on shaft for intake manifold flaps on intake manifold (bottom section).

Note

- ◆ *Renew seals.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Install engine cover panel.

Tightening torques



- ◆ ⇒ "4.1 Exploded view - intake manifold (bottom section) with fuel rail", page 297

2.3.2 Removing and installing vacuum unit for actuating intake manifold flaps, cylinder bank 2 (left-side)

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Hose clip pliers - VAS 6362-



! (noticed from right) Starting for possible reasons (e.g. pressure loss in the

intake air ducts) can cause the fan to start automatically. This is guaranteed by Audi AG. Audi AG is not liable for damage.

! (noted on the car) If the cooling fan starts without warning (for example, during the day), it is not the fault of Audi AG.

- ◆ Torx wrench or bit 10 with ball head (commercially available)

- ◆ Magnetic rod (commercially available)

Removing

- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

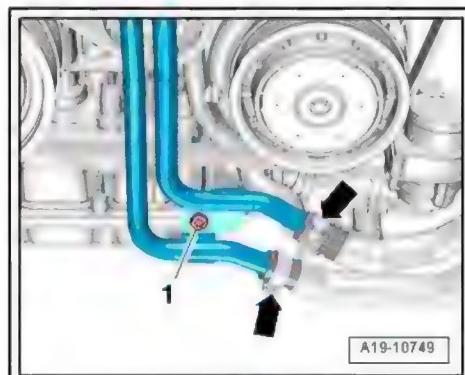


WARNING

Risk of injury as the radiator fans may start up automatically.

- ◆ Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.

- Clamp off coolant hoses -arrows- with hose clamps up to 25 mm - 3094- .
- Remove bolt -1-.



Note

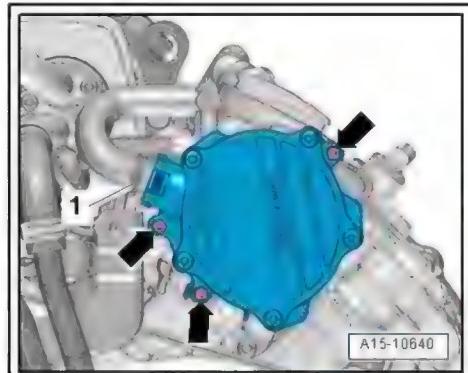
The coolant hoses remain connected.

- Remove engine cover panels [⇒ page 67](#) .
- Release hose clip -1-, disconnect vacuum hose from vacuum pump and move vacuum hose clear.



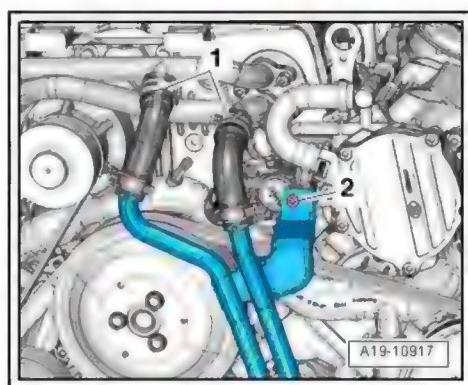
Note

Disregard -arrows-



A15-10640

- Clamp off coolant hoses -1- using hose clamps (up to 25 mm) - 3094- , release hose clips and disconnect coolant hoses from coolant pipes at supercharger.
- Remove bolt -2-.



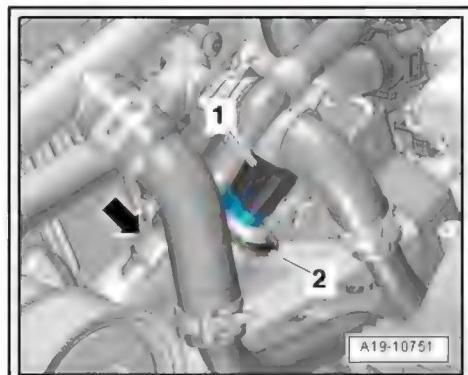
A19-10917

- Unplug electrical connector -1- at coolant temperature sender - G62- .



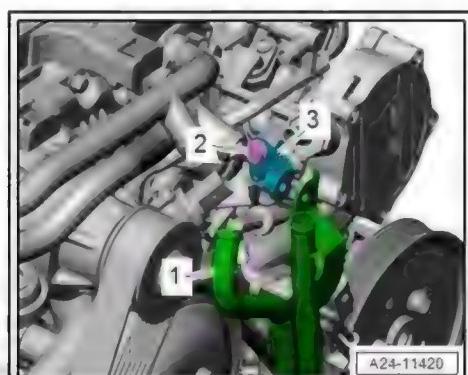
Note

Disregard -item 2- and -arrow-



A19-10751

- Remove bolt -2- and detach bracket -3-.
- Swivel coolant pipe -1- to side.

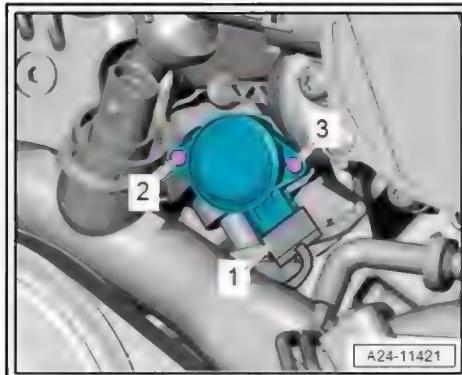


A24-11420

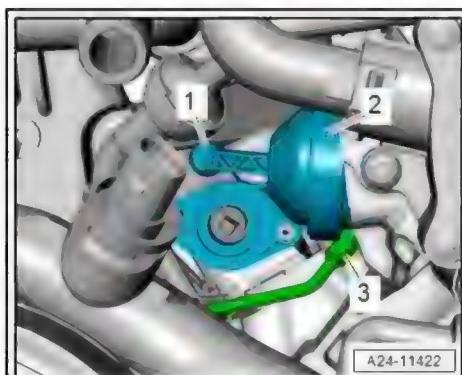
- Remove bolts -2, 3- and detach intake manifold flap potentiometer 2 - G512- .

 Note

It is recommended to use a magnet at this stage to prevent the bolt from falling out.



- Unclip operating rod -1- of vacuum unit -2- from ball head.
- Disconnect vacuum hose -3- and detach vacuum unit.



Installing

Installation is carried out in reverse order; note the following:

The shaft for the intake manifold flaps on the intake manifold (bottom section) and the mounting on the intake manifold flap potentiometer 2 - G512- are rectangular.

- Ensure that mounting on intake manifold flap potentiometer 2 - G512- is correctly positioned on shaft for intake manifold flaps on intake manifold (bottom section).

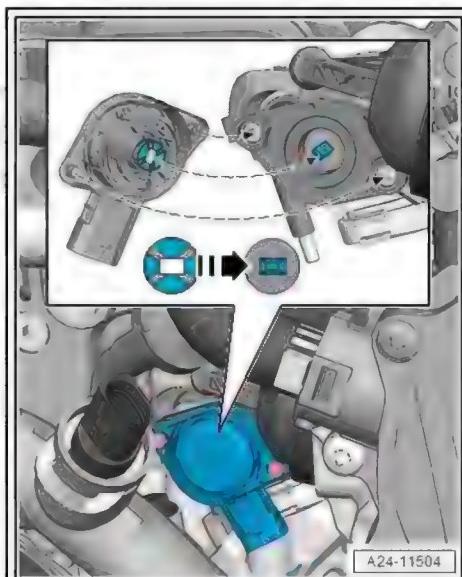
 Note

- ◆ Renew seals.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .

- Install engine cover panels ⇒ [page 67](#) .
- Check coolant level ⇒ [page 207](#) .

Tightening torques

- ◆ ⇒ "4.1 Exploded view - intake manifold (bottom section) with fuel rail", page 297
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation



3 Air cleaner

⇒ "3.1 Exploded view - air cleaner housing", page 295

⇒ "3.2 Removing and installing air cleaner housing", page 295

3.1 Exploded view - air cleaner housing

1 - Air duct

- Clean out salt deposits, dirt and leaves, etc.

2 - Sealing element

3 - Mounting

- For air cleaner housing

4 - Air cleaner housing

- Clean out salt deposits, dirt and leaves, etc.

- Removing and installing
⇒ "3.2 Removing and installing air cleaner housing", page 295

5 - Air filter element

- Use genuine air filter element ⇒ Electronic parts catalogue

- Change intervals ⇒ Maintenance tables

- Removing and installing
⇒ Maintenance ; Booklet 411

6 - Air pipe

- Tightening torque for screw-type clips ⇒ page 272

7 - Cover

- For air cleaner housing

- Remove any salt deposits or dirt

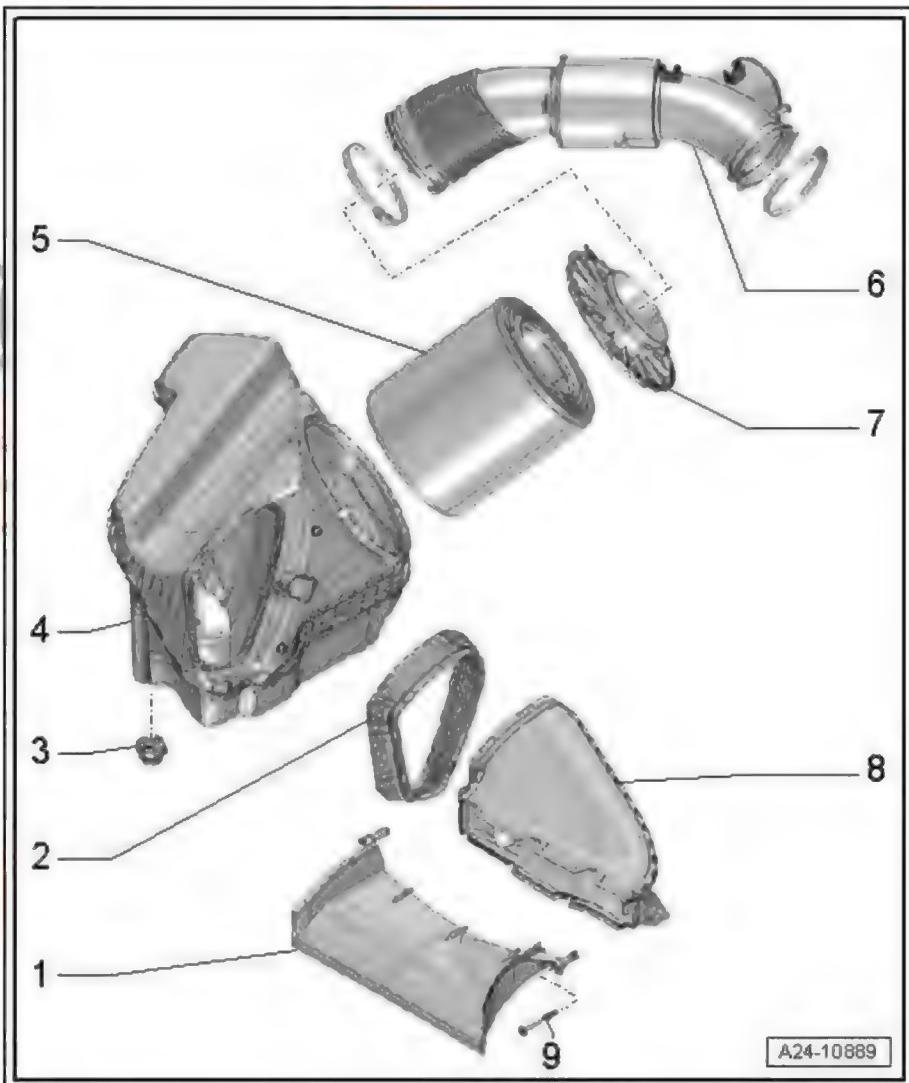
- Removing and installing
⇒ Maintenance ; Booklet 411

8 - Air duct

- Clean out salt deposits, dirt and leaves, etc.

9 - Bolt

- 1.5 Nm



A24-10889

3.2 Removing and installing air cleaner housing

Removing

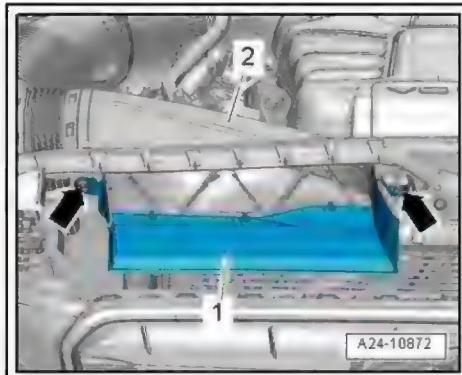
- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .

- Remove bolts -arrows- and detach air duct -2-.

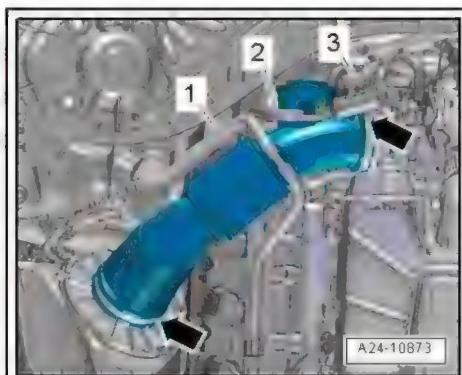


Disregard -item 1-.

- Remove engine cover panel (rear) [⇒ page 67](#).



- Move clear fuel hose -1- and hose -2- leading to activated charcoal filter at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Loosen hose clips -arrows- and detach air pipe.



- Lift off air cleaner housing -1-.
- Press release tabs and disconnect secondary air hose -arrow-.

Installing



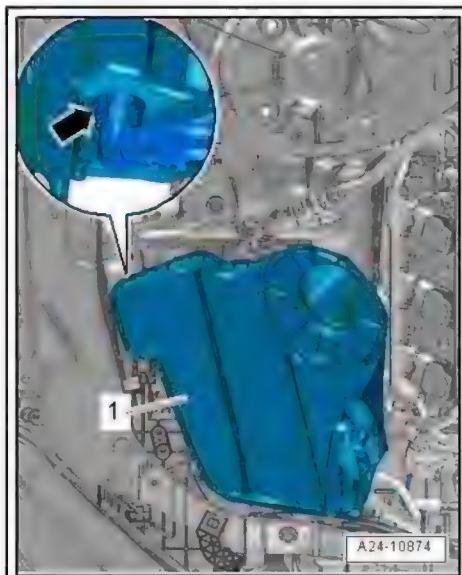
- ◆ *The air cleaner housing must always be clean.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *To prevent malfunctions, cover all critical parts of the engine air intake tract (intake pipes, etc.) with a clean cloth before blowing out the air cleaner housing with compressed air.*

Remaining installation steps are carried out in reverse sequence; note the following:

- Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .

Tightening torques

- ◆ [⇒ "3.1 Exploded view - air cleaner housing", page 295](#)



4 Intake manifold

⇒ "4.1 Exploded view - intake manifold (bottom section) with fuel rail", page 297

⇒ "4.2 Removing and installing intake manifold (bottom section) with fuel rail", page 300

⇒ "4.3 Removing and installing throttle valve module J338", page 303

⇒ "4.4 Cleaning throttle valve module", page 304

⇒ "4.5 Removing and installing regulating flap control unit J808", page 305

4.1 Exploded view - intake manifold (bottom section) with fuel rail



Illustration shows components for cylinder bank 2 (left-side).

1 - Bolts

- 2.5 Nm

2 - Intake manifold flap potentiometer 2 - G512-

- Cylinder bank 1 (right-side): intake manifold flap potentiometer - G336-
- Removing and installing
⇒ "2.3 Removing and installing vacuum unit for actuating intake manifold flaps", page 290

3 - Seal

- Renew if damaged
- When renewing lever out with screwdriver
- Press in by hand

4 - Sleeve

5 - Fuel pressure sender - G247-

- Lubricate threads
- 22 Nm

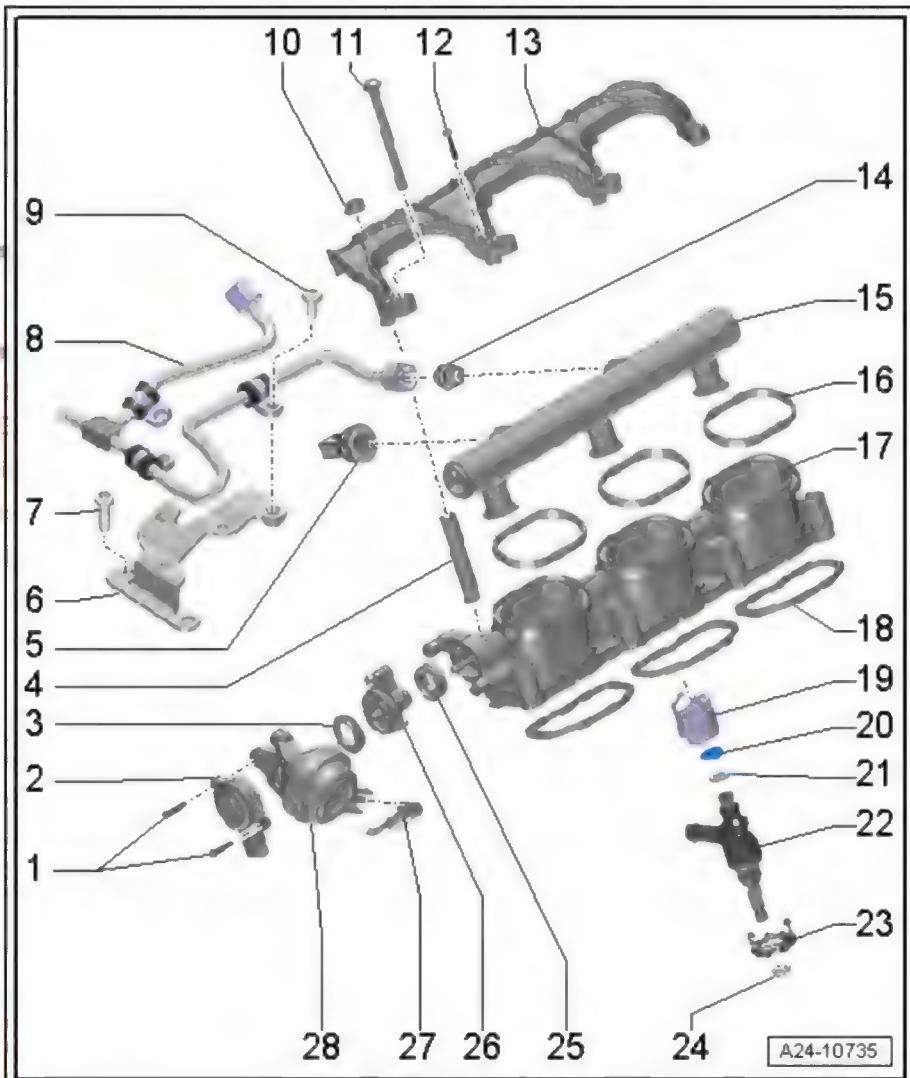
6 - Bracket

7 - Bolt

- 9 Nm

8 - High-pressure pipe

- Removing and installing
⇒ "7.3 Removing and installing high-pressure pipe", page 315
- Do not alter shape
- Check for damage before re-installing
- To loosen and tighten high-pressure pipe, counterhold at pipe connection



- Re-tighten connection for fuel pipe before installing fuel pipe
- Lubricate threads of union nuts with fuel
- 25 Nm

9 - Bolt

- 9 Nm

10 - Nut

- Tightening torque and sequence ⇒ Fig. “Intake manifold (bottom section) - tightening torque”, page 299

11 - Bolt

- Tightening torque and sequence ⇒ Fig. “Intake manifold (bottom section) - tightening torque”, page 299

12 - Bolt

- 2.5 Nm

13 - Retainer

- For fuel rail

14 - Threaded connection

- 40 Nm
- Always renew after removing
- Check tightening torque of threaded connection before fitting union nut

15 - Fuel rail

16 - Seal

- Renew

17 - Intake manifold (bottom section)

- Removing and installing ⇒ “4.2 Removing and installing intake manifold (bottom section) with fuel rail”, page 300

18 - Seal

- Renew

19 - Support ring

- Always renew after removing
- Must be properly seated
- Via this support ring, the fuel rail exerts the force which holds the injector in the cylinder head

20 - O-ring

- Renew
- Lubricate lightly with clean engine oil

21 - Spacer ring

- Renew if damaged

22 - Injector

Removing and installing ⇒ “5.1 Removing and installing injectors”, page 306

23 - Sealing washer

24 - Combustion chamber ring seal

- Renewing ⇒ “5.1 Removing and installing injectors”, page 306

25 - Seal

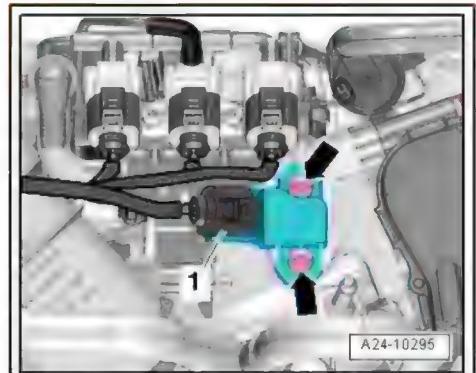
- Renew if damaged
- When renewing lever out with screwdriver
- Press in by hand

26 - Operating rod

- For vacuum unit
- 27 - Vacuum hose
 - To intake manifold flap valve - N316-
- 28 - Vacuum unit
 - For actuating intake manifold flaps
 - Removing and installing ⇒ [“2.3 Removing and installing vacuum unit for actuating intake manifold flaps”, page 290](#)

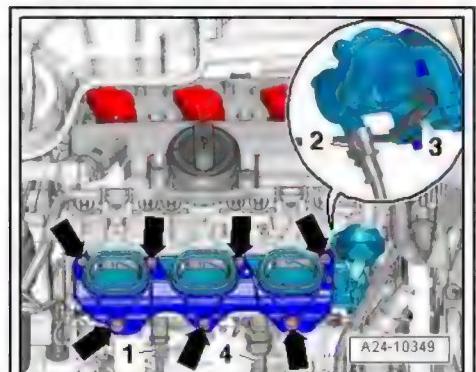
Intake air temperature sender - G42- / intake manifold pressure sender - G71- - tightening torque

- Tighten bolts -arrows- to 10 Nm.



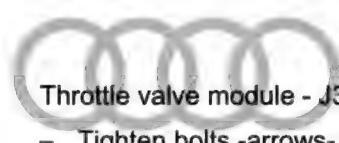
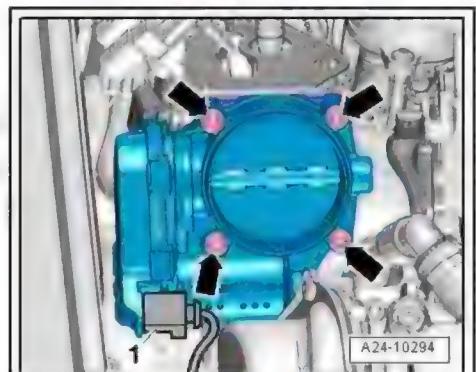
Intake manifold (bottom section) - tightening torque

- Tighten bolts and nuts -arrows- in stages and in diagonal sequence; final torque 9 Nm.



Throttle valve module - J338- - tightening torque

- Tighten bolts -arrows- in diagonal sequence to 10 Nm.

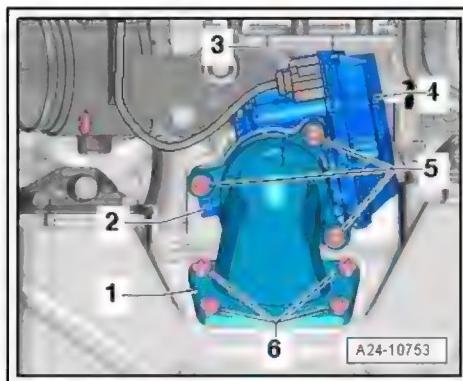


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Regulating flap control unit - J808- - tightening torque and sequence

- Tighten bolts in 3 stages as follows:

Stage	Bolts	Tightening torque
1.	-5, 6-	Screw in by hand until contact is made
2.	-6-	10 Nm
3.	-5-	10 Nm



4.2 Removing and installing intake manifold (bottom section) with fuel rail

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-



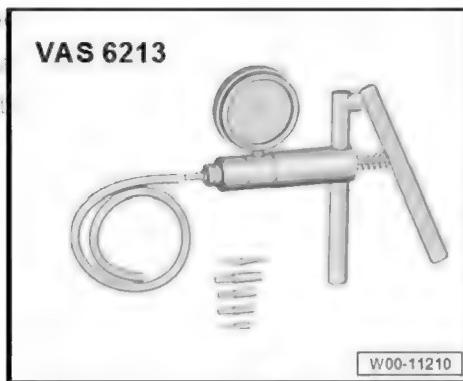
- ◆ Tool inserts - V.A.G 1331/2-

- ◆ Hand vacuum pump - VAS 6213-



V.A.G 1331

W00-11166



VAS 6213

W00-11210

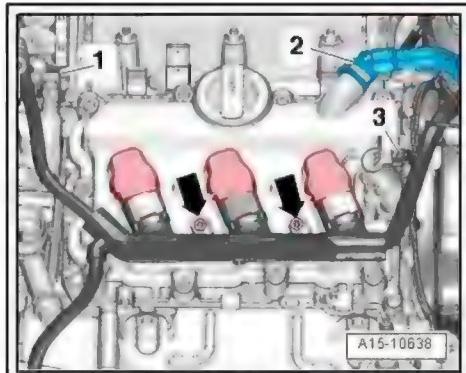
Removing



Note

The removal and installation procedures are described for cylinder bank 2 (left-side).

- Unplug electrical connector from Hall sender 2 - G163- -1-.
- Remove supercharger [⇒ page 259](#).
- Push vacuum hoses to one side.



- Unplug electrical connector -4- at fuel pressure sender - G247- .

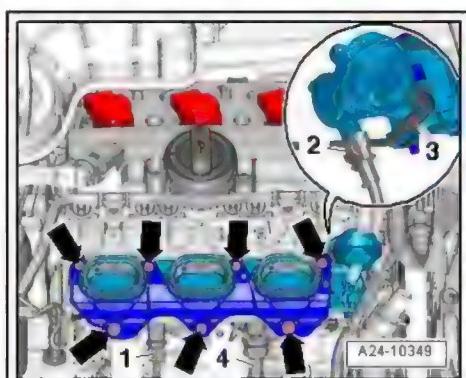


WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap a clean cloth around connection and open connection carefully).



- Unscrew union nut -1- (counterhold threaded connection).
- Remove bolts and nuts -arrows- and detach intake manifold (bottom section) with fuel rail.
- Unplug electrical connector -2- at intake manifold flap potentiometer and pull off vacuum hose -3-.



Caution

Risk of irreparable damage to engine.

- ◆ Block off the intake ports with clean cloths to prevent small objects from dropping into the engine through the intake ports in the cylinder heads.

Installing

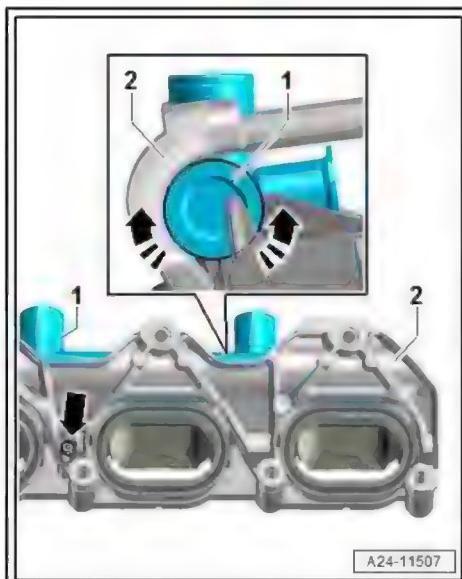
Installation is carried out in reverse order; note the following:



Note

- ◆ If an injector has been pulled out of the cylinder head, the teflon ring seal must be renewed.
- ◆ If threaded connection [⇒ Item 14 \(page 298\)](#) has been loosened or removed, it must be renewed.
- ◆ Renew seals and O-rings.
- ◆ Lubricate O-rings of injectors lightly with clean engine oil.

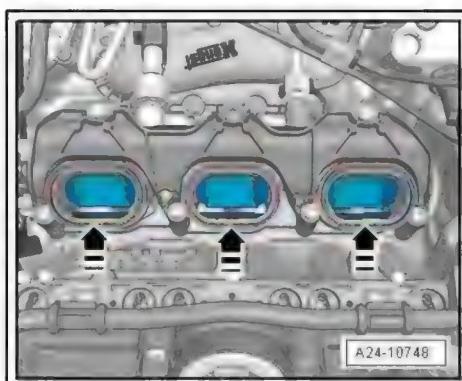
- Before installing intake manifold (bottom section), loosen bolt -arrow- and move fuel rail -1- back and forth in direction of -arrows-.
- If fuel rail -1- cannot be moved, remove and clean retainer for fuel rail -2-.
- Re-assemble retainer for fuel rail -2- and fuel rail -1-, only tightening bolt -arrow- hand-tight.



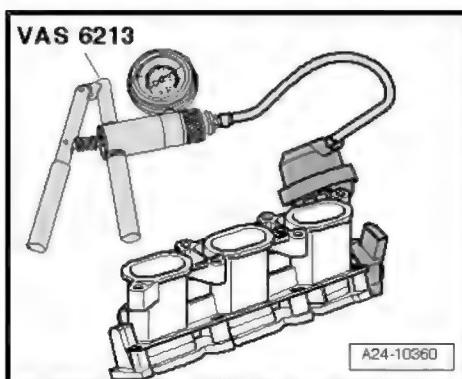
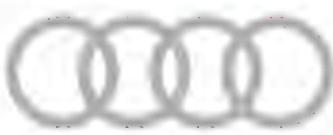
Caution

Risk of damage to intake manifold flaps.

- ◆ To prevent the intake manifold flaps from catching on the guide plates in the cylinder head, the flaps must be in the power mode position -arrows- (intake passage fully open) when the intake manifold (bottom section) is installed.



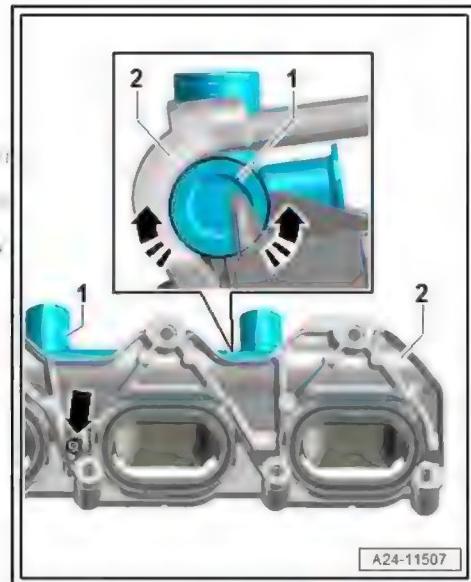
- Connect hand vacuum pump - VAS 6213- to vacuum unit for actuating intake manifold flaps, as shown in illustration.
- Use vacuum pump to generate a vacuum.
- This will cause the intake manifold flaps to open.
- Press intake manifold (bottom section) with fuel rail evenly onto injectors.
- Tighten bolts and nuts for intake manifold (bottom section) in diagonal sequence [⇒ page 299](#).



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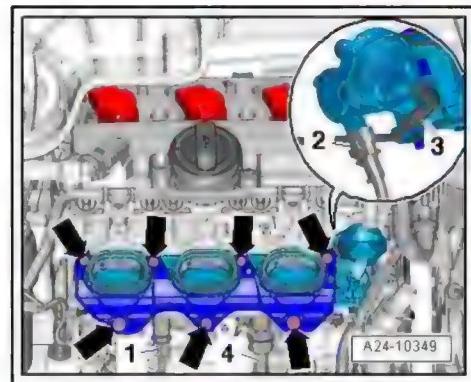
- Tighten bolt -arrow- to 1 Nm.



- Disconnect hand vacuum pump from vacuum unit for actuating intake manifold flaps.
- Plug in electrical connector -4- at fuel pressure sender - G247- .
- Tighten union nut -1- (counterhold threaded connection).
- Install high-pressure pipe [⇒ page 315](#) .
- Ensure that high-pressure pipe is not under tension.
- Install supercharger [⇒ page 259](#) .

Tightening torques

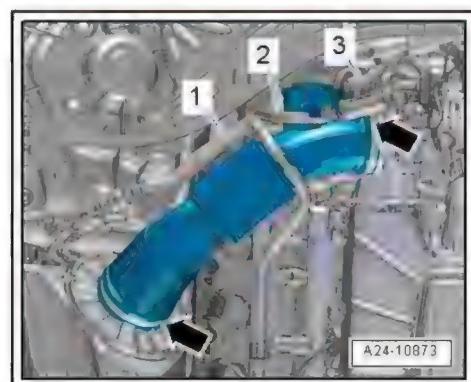
- ◆ [⇒ "4.1 Exploded view - intake manifold \(bottom section\) with fuel rail", page 297](#)
- ◆ [⇒ Fig. "Intake manifold \(bottom section\) - tightening torque", page 299](#)



4.3 Removing and installing throttle valve module - J338-

Removing

- Remove engine cover panel (rear) [⇒ page 67](#) .
- Move clear fuel line -1- and line -2- going to activated charcoal filter at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Loosen hose clips -arrows- and detach air pipe.



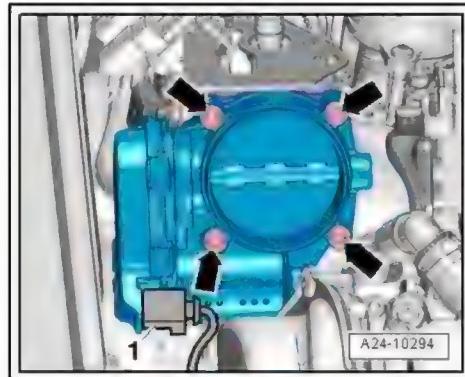
- Unplug electrical connector -1-.
- Remove bolts -arrows- and detach throttle valve module - J338- with intermediate flange.



Caution

Risk of irreparable damage to engine.

- ◆ *Block off the intake port with a clean cloth to prevent small items from dropping into the supercharger.*



Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ *Fit new O-rings.*
- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *To ensure that the air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*

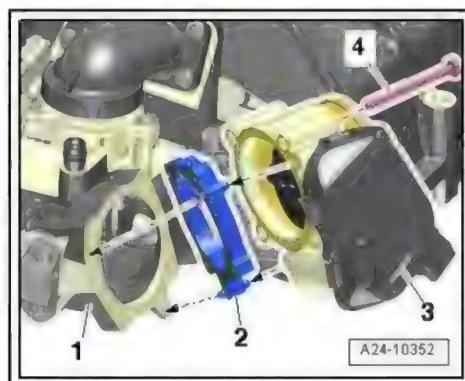
- Insert intermediate flange -2- with O-rings into supercharger -1- -left arrows-.
- Fit throttle valve module - J338- -item 3- on intermediate flange -right arrows-.
- Tighten bolts -4- for throttle valve module [⇒ page 299](#).

If throttle valve module - J338- has been cleaned or renewed:

- Erase learnt values and adapt engine control unit - J623- to throttle valve module - J338- ⇒ Vehicle diagnostic tester.

Tightening torques

- ◆ [⇒ Fig. "Throttle valve module -J338- - tightening torque" , page 299](#)
- ◆ [⇒ "2.2 Exploded view - hose connections for charge air system" , page 272](#)

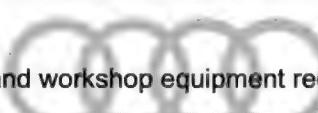


4.4 Cleaning throttle valve module



Note

Take care not to scratch the throttle valve housing when cleaning it.



Special tools and workshop equipment required

- ◆ Acetone (commercially available)
- ◆ Brush

Procedure

- Remove throttle valve module - J338- [⇒ page 303](#).

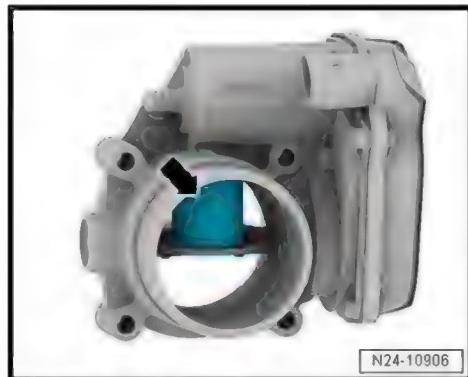
- Open throttle valve by hand and block it in the open position with a suitable object (e.g. plastic or wooden wedge) -arrow-.



WARNING

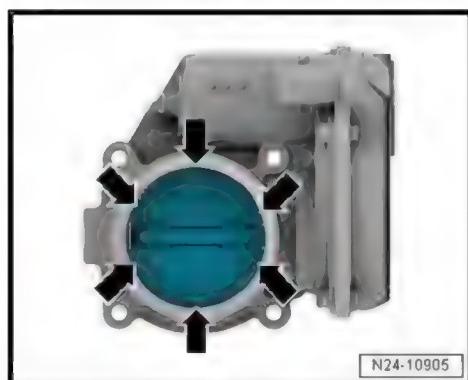
Risk of injury caused by acetone. Acetone is highly flammable and can cause irritation to the eyes and skin.

- Put on safety goggles.
- Put on protective gloves.



N24-10906

- Clean throttle valve housing thoroughly, especially around the points -arrows- where the throttle valve closes, using commercially available acetone and a small brush.
- Wipe out throttle valve housing with a lint-free cloth.
- Allow acetone to evaporate completely and re-install throttle valve module after cleaning.
- Install throttle valve module - J338- [⇒ page 303](#).
- Erase learnt values and adapt engine control unit - J623- to throttle valve module. Use ⇒ Vehicle diagnostic tester.



N24-10905

4.5 Removing and installing regulating flap control unit - J808-

Removing

- Remove engine cover panel (rear) [⇒ page 67](#).
- Unplug electrical connector -3-.
- Remove bolts -5- and -6-.
- Detach bypass elbow -1- with adapter (intermediate flange) -2- and regulating flap control unit - J808- -4-.

Installing

Installation is carried out in reverse order; note the following:



Note

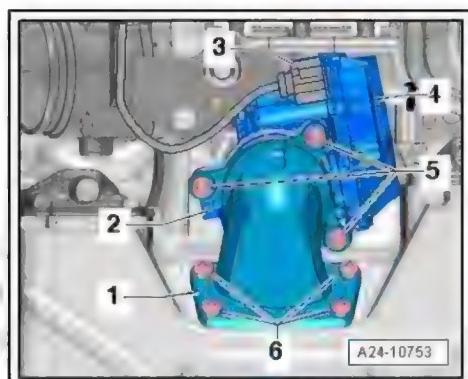
Fit new O-rings.

If a new regulating flap control unit - J808- has been installed:

- Erase learnt values and adapt engine control unit - J623- to regulating flap control unit - J808- . Use ⇒ Vehicle diagnostic tester.

Tightening torques

- ◆ [⇒ Fig. "Regulating flap control unit -J808- - tightening torque and sequence" , page 300](#)



A24-10753

5 Injectors

⇒ “5.1 Removing and installing injectors”, page 306

⇒ “5.2 Cleaning injectors”, page 309

5.1 Removing and installing injectors

Special tools and workshop equipment required

- ◆ Tool set for FSI engines - T10133 C-



W00-11512

Removing

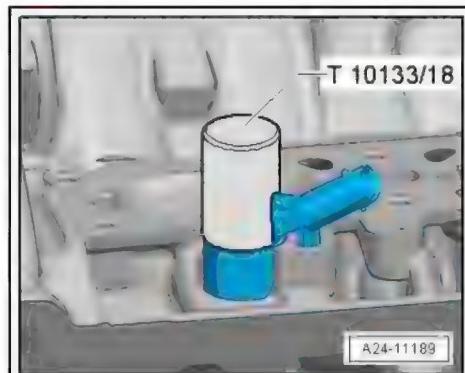
- Remove supercharger ⇒ page 259 .
- Remove corresponding intake manifold (bottom section) ⇒ page 300 .

Removing any injectors lodged in fuel rail

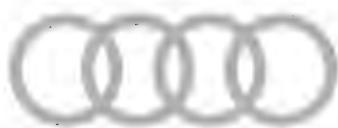
- Carefully pull injectors out of fuel rail.

Removing any injectors lodged in cylinder head

- Cover open inlet ports with a clean cloth.
- Unplug electrical connector at injector that is to be removed.
- Slide stop sleeve -T10133/18- over injector.

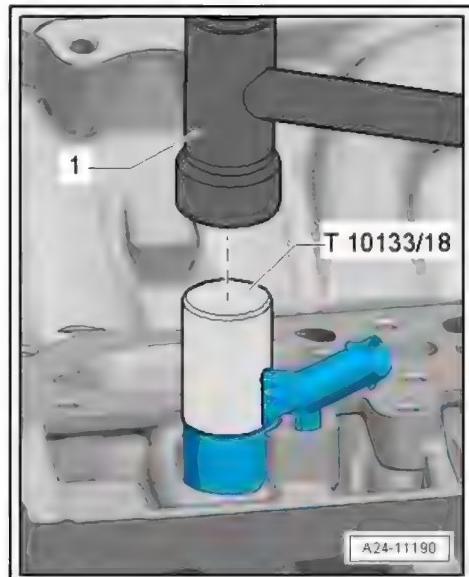


A24-11189

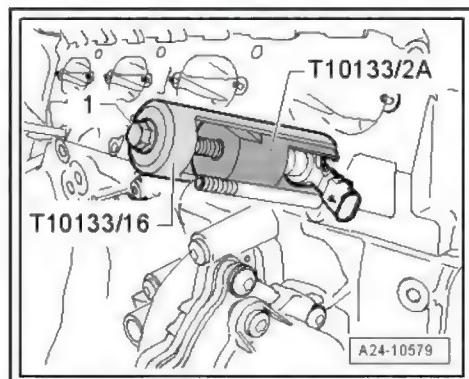


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- Carefully knock against stop sleeve several times to loosen injector.



- Apply puller -T10133/2A- to groove on injector.
- Attach removal tool -T10133/16- and pull out injector by turning bolt -1-.



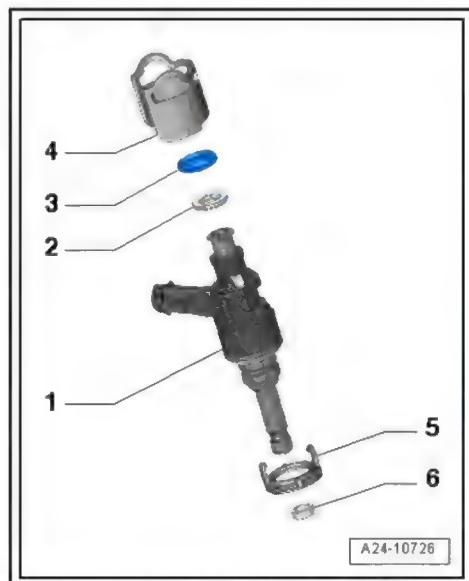
Dismantling injector

- Pull support ring -4-, O-ring -3- and spacer ring -2- off injector -1-.
- Unclip sealing element -5-.
- Carefully remove old combustion chamber ring seal -6-. To do so, cut open combustion chamber ring seal using knife or prise open with small screwdriver and then pull off forwards.



Note

Take care not to damage groove on injector. Injector must be renewed if groove is damaged.



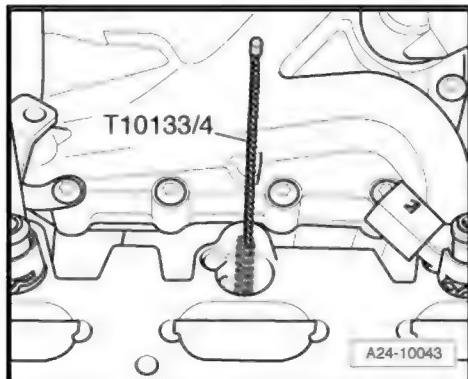
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Installing

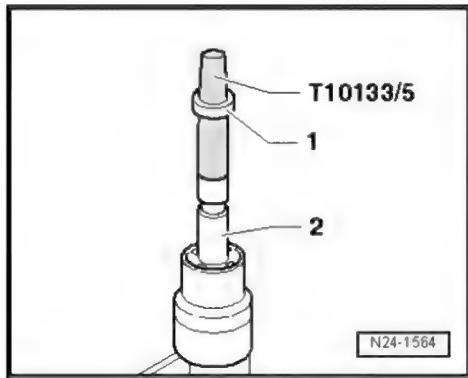


Note

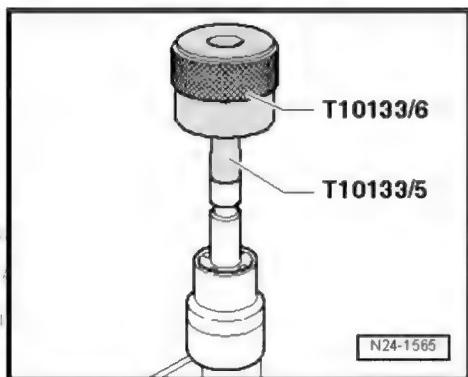
- ◆ Renew sealing element, combustion chamber ring seal and O-ring.
- ◆ Renew spacer ring if damaged.
- ◆ Lubricate O-rings of injectors lightly with clean engine oil.
- Clean bore in cylinder head with nylon cylinder brush - T10133/4- .
- When re-installing an injector, clean any combustion residue off groove for combustion chamber ring seal and injector stem with a clean cloth.
- Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- from repair kit onto injector -2-.



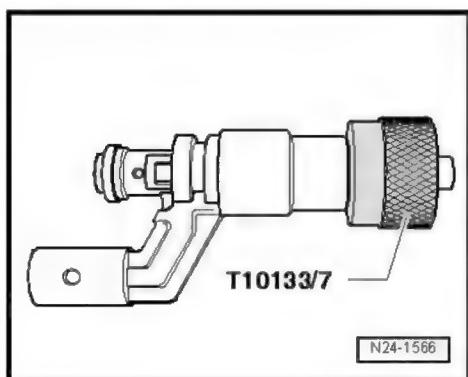
A24-10043



N24-1564



N24-1565



N24-1566

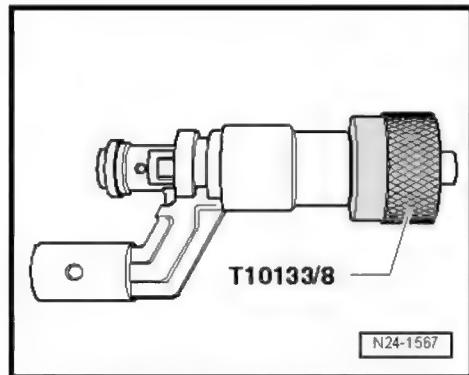


Note

The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in two stages, as described below.

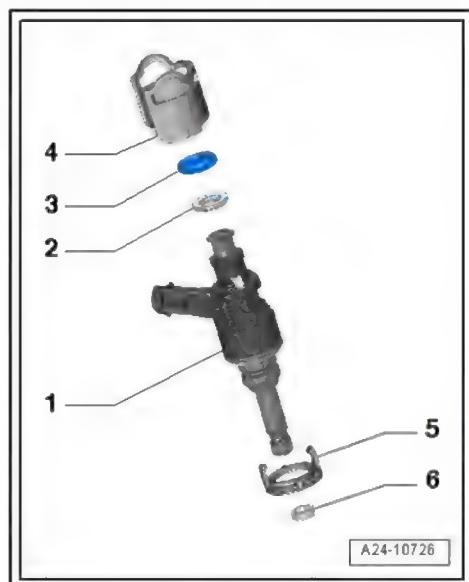
- Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.

- Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.



N24-1567

- Fit parts from repair kit onto injector -1-:
- 2 - Spacer ring - renew
- 3 - O-ring - renew (apply thin coating of clean engine oil prior to installation)
- 4 - Support ring - renew (via this support ring, fuel rail exerts force which secures injector in cylinder head)
- 5 - Retaining ring - renew (combined as a unit with intermediate ring -2-)
- 6 - Combustion chamber ring seal (teflon ring seal) - renew; when fitting, do not grease ring or use any other lubricant
- Push injector by hand as far as it will go into aperture in cylinder head (do not use oil or grease). Ensure that the injector is properly seated in the cylinder head.

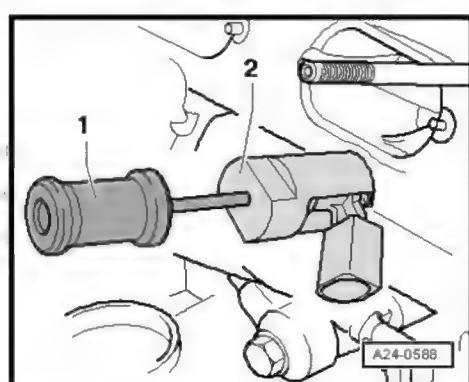


A24-10726



Note

- ◆ It should be possible to insert injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.
- ◆ Note correct installation position and ensure that injectors are properly seated in cylinder head.
- ◆ If the injector cannot be pushed in by hand, use puller - T10133/2A- -2- with striker - T10133/3- to insert the injector.
- Electrical connector of injector must engage in recess in cylinder head.



A24-0588

Perform further installation in reverse order, paying attention to the following:

- Install intake manifold (bottom section) [⇒ page 300](#).
- Install supercharger [⇒ page 259](#).

5.2 Cleaning injectors

Special tools and workshop equipment required

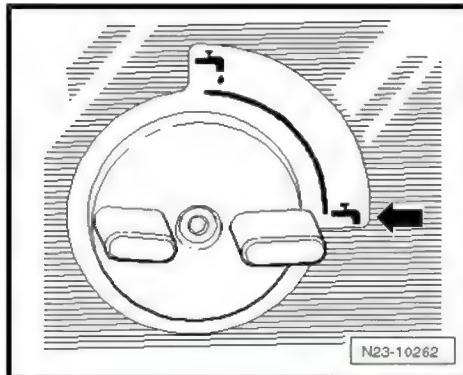
- ◆ Ultrasonic cleaning unit - VAS 6418-
- ◆ Mounting plate for injection modules - VAS 6418/1-
- ◆ Cleaning fluid - VAS 6418/2-

Cleaning

- Remove injectors [page 306](#).
- Close drain tap -arrow- on ultrasonic cleaning unit - VAS 6418- (located on right side of housing).
- Fill ultrasonic unit with 2,120 ml of water which has been allowed to settle for a few minutes and cleaning fluid - VAS 6418/2-.

Mixture ratio for cleaning fluid

- 2,100 ml of tap water which has been allowed to settle for a few minutes and 20 ml of cleaning fluid - VAS 6418/2-



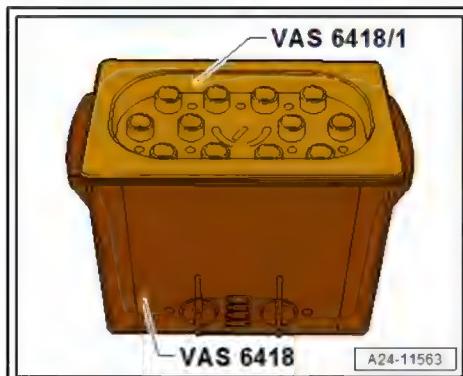
- Place mounting plate for injection modules - VAS 6418/1- on top of cleaning unit.



WARNING

It is important to read the safety notes in the operating instructions before switching on the ultrasonic cleaning unit - VAS 6418- .

The ideal fluid level is approx. 1-4 mm above the base of the mounting plate. The ultrasonic cleaning unit - VAS 6418- can be damaged if the fluid level is too low.

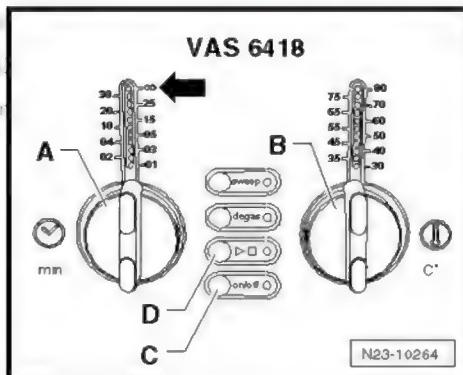


- Insert FSI injectors all the way into guides of mounting plate for injection modules - VAS 6418/1- .
- Switch on cleaning unit by pressing **[on/off]** button -C-
- Select a cleaning time of 30 minutes with rotary control -A-
- Set rotary control -B- to a temperature of 50°C.
- Press **[]** button -D- to start cleaning procedure.



Note

- ◆ *The temperature-controlled cleaning process is now started. While the fluid is being heated, the ultrasound is activated at intervals in order to circulate the cleaning solution. The ultrasound is activated continuously when the preselected temperature is reached.*
- ◆ *The actual cleaning process commences when the temperature reaches at least 50 °C and must last for at least 30 minutes.*
- Install injectors with new combustion chamber seal [page 306](#).



6 Senders and sensors

⇒ "6.1 Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71", page 311

6.1 Removing and installing intake air temperature sender - G42- / intake manifold pressure sender - G71-

Removing

- Remove engine cover panel (rear) ⇒ [page 67](#).
- Unplug electrical connector -1-.
- Unscrew bolts -arrows- and detach intake air temperature sender - G42- / intake manifold pressure sender - G71- .

Installing

Installation is carried out in reverse order; note the following:

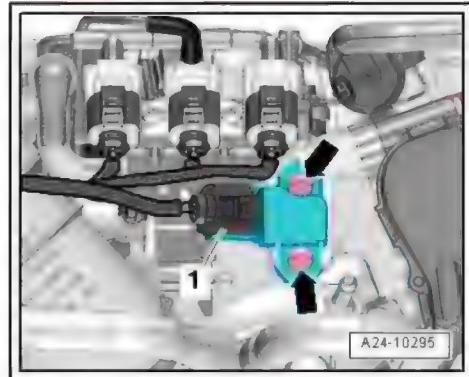


Note

Fit new O-rings.

Tightening torques

- ◆ ⇒ Fig. "" Intake air temperature sender -G42- / intake manifold pressure sender -G71- - tightening torque"" , page 299



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7 High-pressure pump

- ⇒ "7.1 Exploded view - high-pressure pump", page 312
- ⇒ "7.2 Removing and installing high-pressure pump", page 313
- ⇒ "7.3 Removing and installing high-pressure pipe", page 315

7.1 Exploded view - high-pressure pump

1 - Fuel pressure sender for low pressure - G410-

- 15 Nm

2 - Not fitted

3 - Bolt

- Tightening torque and sequence ⇒ Fig. "High-pressure pump - tightening torque and sequence", page 313

4 - High-pressure pump

- With fuel metering valve - N290-
- Removing and installing ⇒ "7.2 Removing and installing high-pressure pump", page 313
- Do not dismantle

5 - Threaded connection

- Connections must not be damaged
- Always renew after removing
- 27 Nm

6 - Fuel supply hose

- Low-pressure section

7 - High-pressure pipe

- Removing and installing ⇒ "7.3 Removing and installing high-pressure pipe", page 315
- Do not alter shape
- Check for damage before re-installing
- Lubricate thread of union nut with fuel
- 27 Nm

8 - Gasket

- Renew

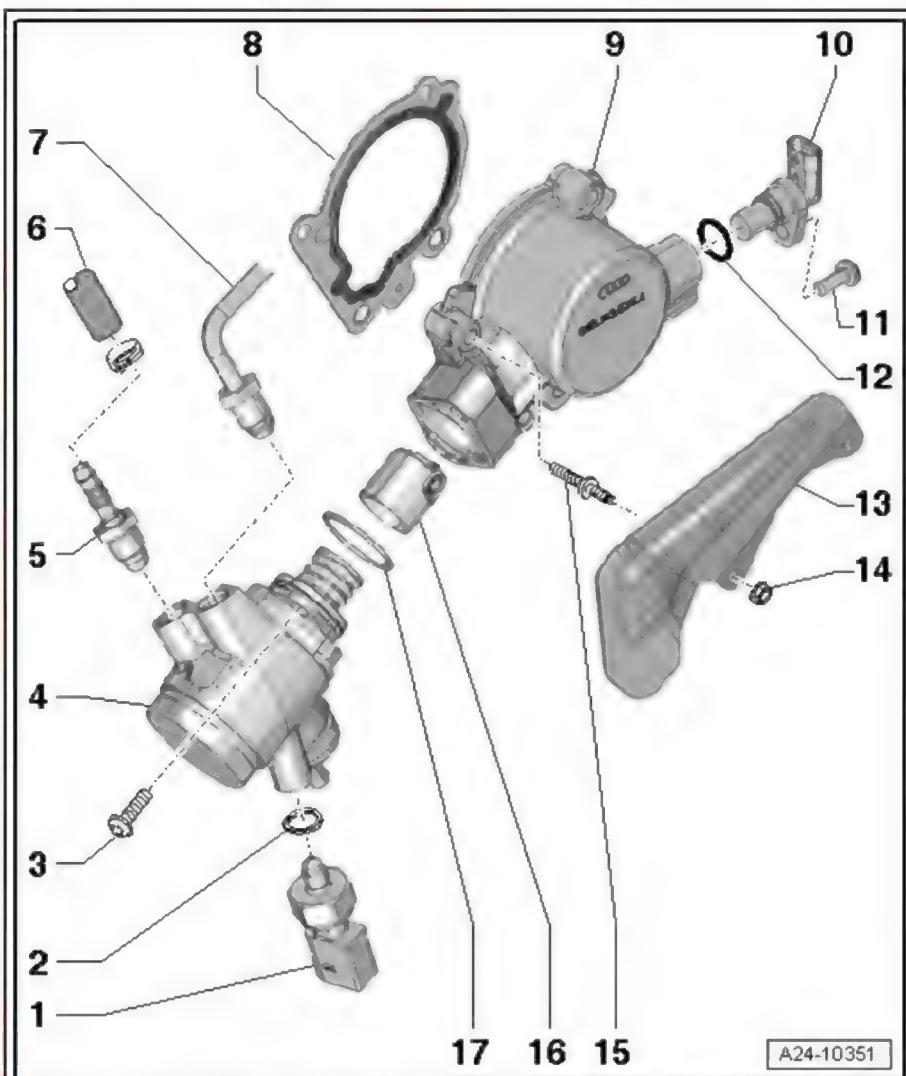
9 - Housing

10 - Hall sender - G40-

- Removing and installing ⇒ "1.5 Removing and installing Hall senders", page 366

11 - Bolt

- 9 Nm



A24-10351

12 - O-ring

- Renew

13 - Guard plate

- For high-pressure pipe

14 - Nut

- 9 Nm

15 - Threaded pin

- 9 Nm

16 - Roller tappet

- Can only be installed in one position
- Lubricate lightly with clean engine oil before installing

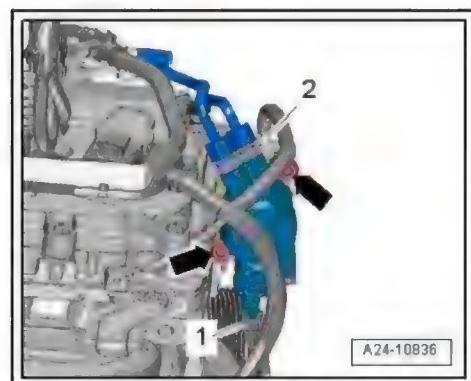
17 - O-ring

- Renew
- Lubricate lightly with clean engine oil before installing

High-pressure pump - tightening torque and sequence

- Tighten bolts in 2 stages as follows:

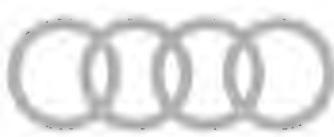
Stage	Bolts	Tightening torque
1.	-arrows-	Screw in by hand until contact is made
2.	-arrows-	Tighten in stages; final torque 20 Nm



7.2 Removing and installing high-pressure pump

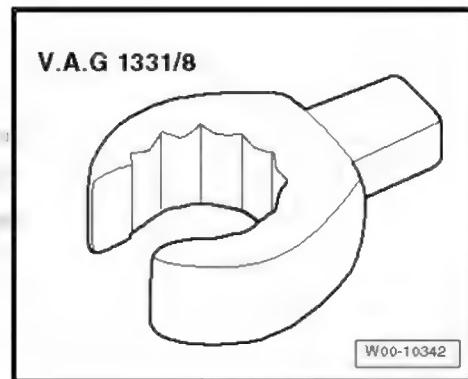
Special tools and workshop equipment required

- ◆ Ratchet - V.A.G 1331/1-



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- ◆ Socket insert AF 14, flared ring spanner - V.A.G 1331/8-

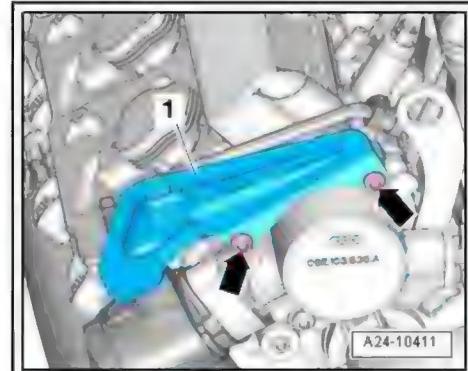


Removing

Note

- ◆ The high-pressure pump should only be removed and installed when the engine is cold.
- ◆ When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.
- ◆ Use a cloth to catch escaping fuel.
- ◆ Always ensure that the high-pressure fuel pipes are free of tension when tightening the connections.

- Remove air cleaner housing [⇒ page 295](#).
- Unscrew nuts -arrows- and remove guard plate -1-.



- Unplug electrical connectors -1- and -6-.
- Remove bolt -3- on retaining clip.



WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap a clean cloth around connection and open connection carefully).



- Unscrew connections -2- and -5-.
- Remove bolts -arrows-.

- Carefully pull out high-pressure pump. It is possible that the roller tappet may remain lodged inside.



Note

- ◆ *Do not attempt to bend high-pressure pipe to a different shape.*
- ◆ *Disregard -item 4-.*

Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ *Fit new O-ring.*
- ◆ *The connections of the high-pressure pipe must not be damaged.*
- ◆ *Do not attempt to bend high-pressure pipe to a different shape.*

- Check roller tappet -1- for damage and renew if necessary.
- Lightly lubricate roller tappet with oil and insert it so that lug -arrow A- slides into guide notch -arrow B-.
- Rotate crankshaft in direction of engine rotation by turning bolt for vibration damper, and at the same time press roller tappet into cylinder head until it reaches its lowest point.
- Only lift high-pressure pipe slightly to fit high-pressure pump.
- + Press high-pressure pump down by hand as far as possible onto stop.
- At the same time, tighten securing bolts by hand.

Then tighten securing bolts alternately to 5 Nm (do not tilt high-pressure pump).

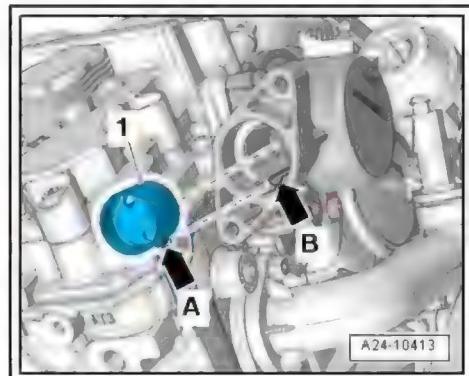
- Now tighten securing bolts alternately to final torque.
- Install high-pressure pipe [⇒ page 315](#).
- Install air cleaner housing [⇒ page 295](#).
- Check fuel system for leaks [⇒ page 287](#).

Tightening torques

- ◆ [⇒ Fig. "High-pressure pump - tightening torque and sequence", page 313](#)
- ◆ [⇒ "7.1 Exploded view - high-pressure pump", page 312](#)

7.3 Removing and installing high-pressure pipe

Special tools and workshop equipment required



- ◆ Torque wrench - V.A.G 1331-

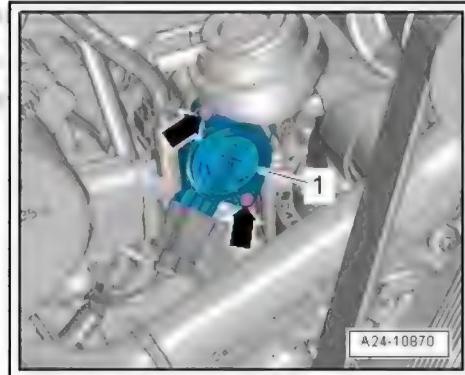


- ◆ Open end spanner insert, AF 17 - V.A.G 1331/6-

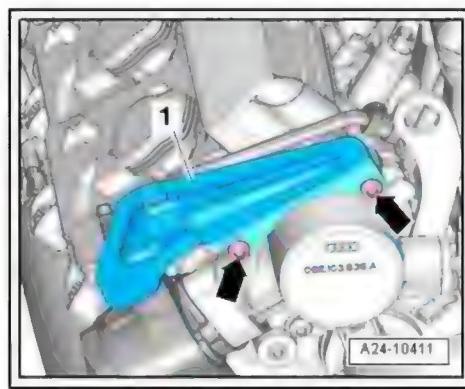
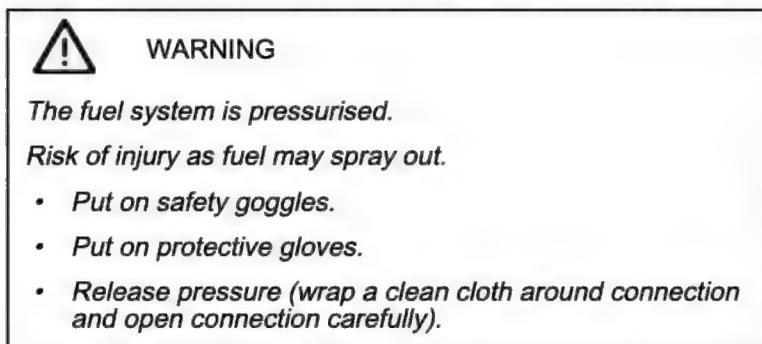


Removing

- Remove supercharger [page 259](#).
- Remove bolts -arrows- and move intake manifold flap potentiometer - G336- (right-side) -item 1- with vacuum unit for intake manifold flap clear to one side.
with respect to the correctness of



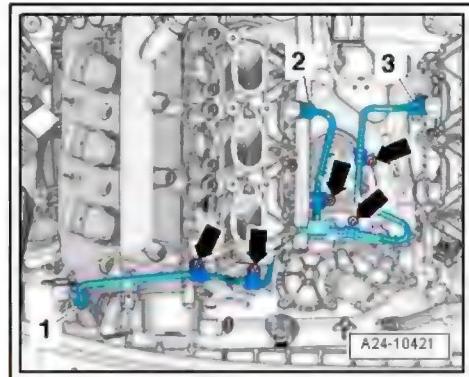
- Unscrew nuts -arrows- and remove guard plate -1-.



- Unscrew bolts -arrows- and connection -1-.
- Unscrew union nuts -2- and -3- (counterhold threaded connection).

 Note

- ◆ *Do not attempt to bend high-pressure pipe to a different shape.*
- ◆ *The threaded connection on the fuel rail must be renewed if it has been loosened or removed at union nuts -2- and -3- ⇒ Item 14 (page 298).*



Installing

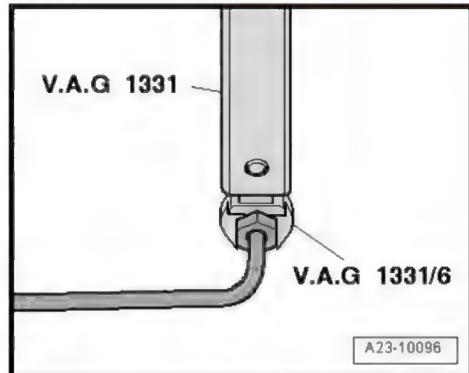
 Note

- ◆ *The connections of the high-pressure pipe must not be damaged.*
- ◆ *Do not attempt to bend high-pressure pipe to a different shape.*

- First tighten union nut by hand until it makes contact, making sure that high-pressure pipe is not under tension.
- Tighten union nut with torque wrench - V.A.G 1331- and open end spanner insert AF 17 - V.A.G 1331/6- ; to do so, counterhold at hexagon flats of threaded connection on fuel rail with an open-end spanner.
- Do not tighten bolt for retainer until high-pressure pipe has been tightened.
- Install supercharger ⇒ [page 259](#) .

Tightening torques

- ◆ ⇒ “4.1 Exploded view - intake manifold (bottom section) with fuel rail”, [page 297](#)
- ◆ ⇒ “7.1 Exploded view - high-pressure pump”, [page 312](#)



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8 Lambda probe

⇒ "8.1 Exploded view - Lambda probe", page 318

⇒ "8.2 Removing and installing Lambda probe", page 318

8.1 Exploded view - Lambda probe



Note

- ◆ New Lambda probes are coated with an assembly paste.
- ◆ In the case of a used Lambda probe, coat only the thread with high-temperature paste; refer to ⇒ Electronic parts catalogue for high-temperature paste.
- ◆ The assembly paste/high-temperature paste must not make contact with the slots on the Lambda probe body.

1 - Lambda probe 2 after catalytic converter - G131-

- With Lambda probe 2 heater after catalytic converter - Z30-
- Removing and installing
⇒ page 320
- 55 Nm

2 - Lambda probe 2 - G108-

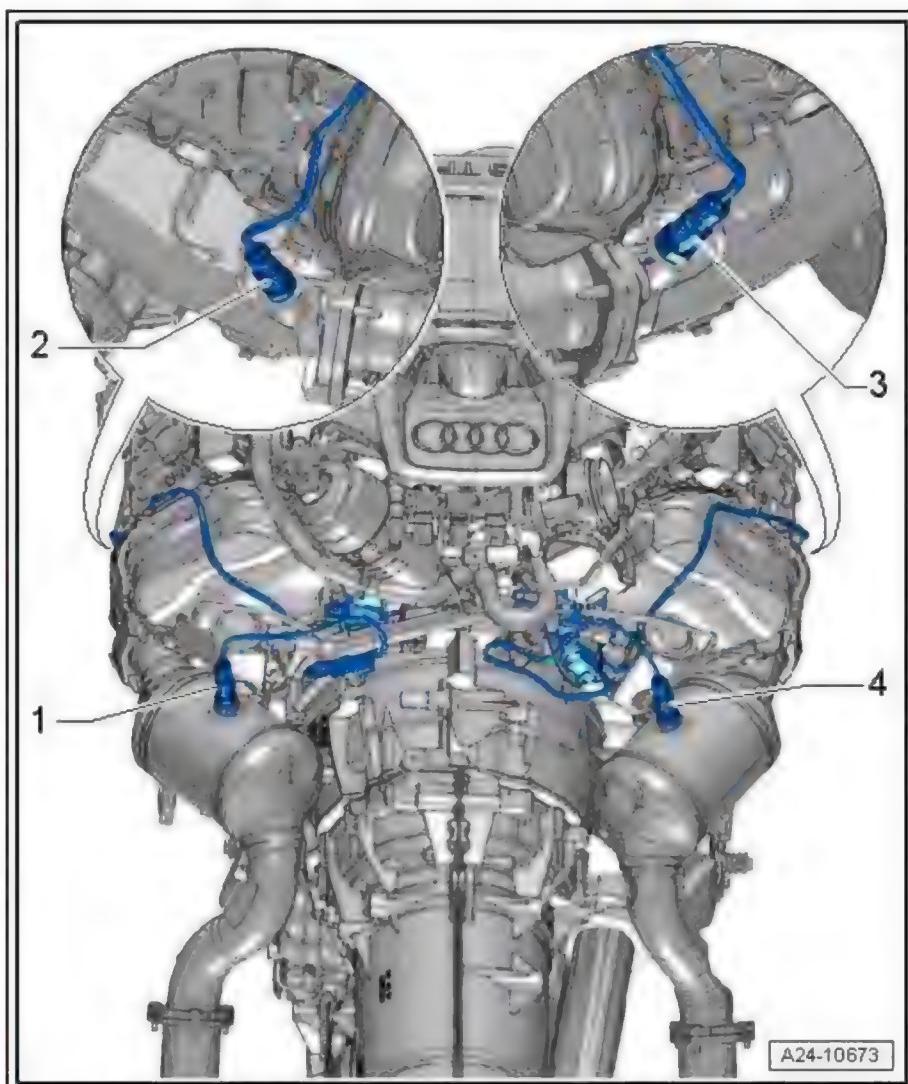
- With Lambda probe heater 2 - Z28-
- Removing and installing
⇒ page 320
- 55 Nm

3 - Lambda probe - G39-

- With Lambda probe heater - Z19-
- Removing and installing
⇒ page 319
- 55 Nm

4 - Lambda probe after catalytic converter - G130-

- With Lambda probe 1 heater after catalytic converter - Z29-
- Removing and installing
⇒ page 319
- 55 Nm



8.2 Removing and installing Lambda probe

⇒ "8.2.1 Removing and installing Lambda probe G39 / Lambda probe after catalytic converter G130", page 319

⇒ "8.2.2 Removing and installing Lambda probe 2 G108 / Lambda probe 2 after catalytic converter G131", page 320

8.2.1 Removing and installing Lambda probe - G39- / Lambda probe after catalytic converter - G130-

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-



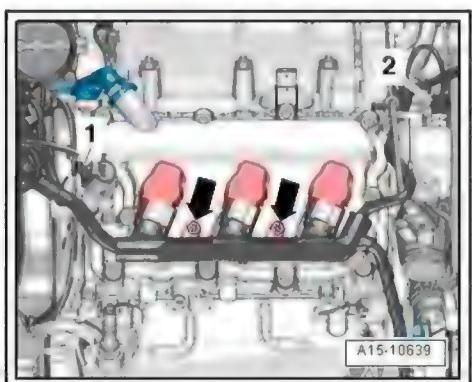
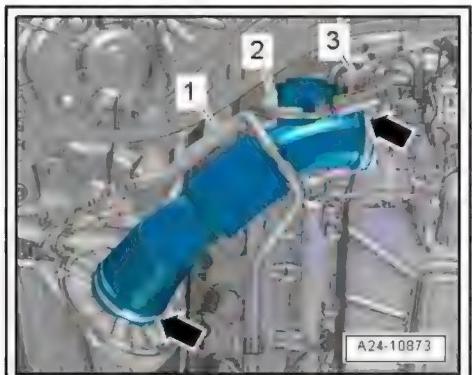
Removing

- Remove engine cover panel (rear) ⇒ page 67 .
- Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Loosen hose clips -arrows- and detach air pipe.
- Unscrew bolts -arrows- and unplug electrical connectors at ignition coils.
- Press electrical wiring harness up slightly.



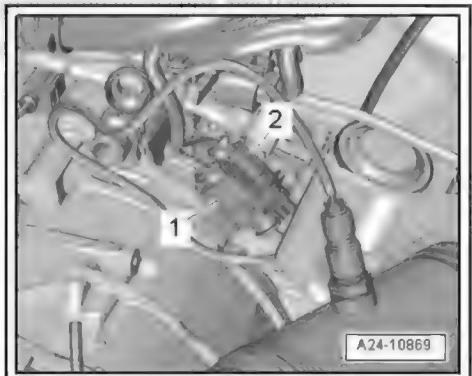
Note

Disregard items -1 and 2-.



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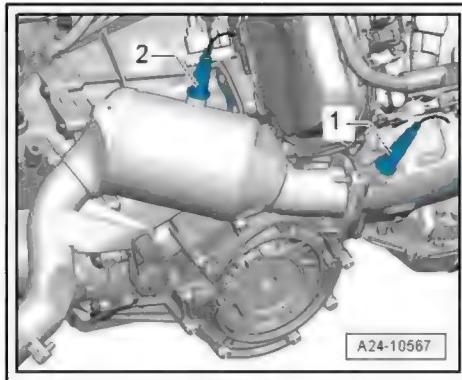
- Unplug relevant electrical connector and move electrical wiring clear respect to the correctness of information in this document.
- 1 - For Lambda probe after catalytic converter - G130-
- 2 - For Lambda probe - G39-



- Unscrew relevant Lambda probes:
 - 1 - Lambda probe - G39- using ring spanner -3337/7-
 - 2 - Lambda probe after catalytic converter - G130- using ring spanner -3337/2-



For illustration purposes, the installation position is shown with the engine removed.



Installing

Installation is carried out in reverse order; note the following:



- ◆ *New Lambda probes are coated with an assembly paste.*
- ◆ *If re-installing the old Lambda probes, coat the threads with high-temperature paste ⇒ Electronic parts catalogue .*
- ◆ *The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body.*
- ◆ *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- ◆ *Fit all cable ties in the original positions when installing.*

Tightening torques

- ◆ [⇒ “8.1 Exploded view - Lambda probe”, page 318](#)
- ◆ [⇒ “2.2 Exploded view - hose connections for charge air system”, page 272](#)

8.2.2 Removing and installing Lambda probe 2 - G108- / Lambda probe 2 after catalytic converter - G131-

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-

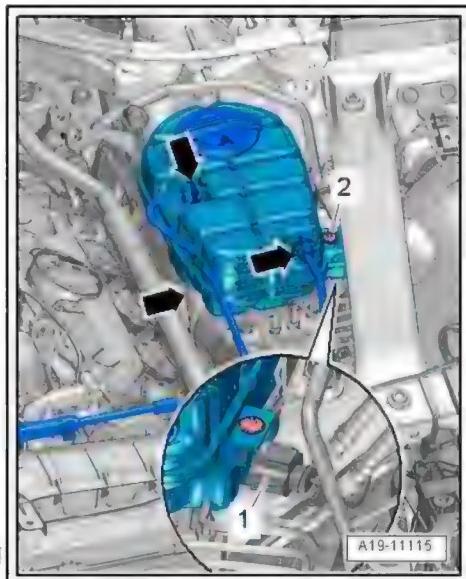


Removing

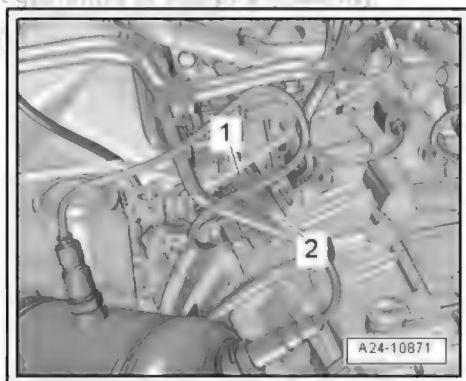
- Remove engine cover panel (rear) ⇒ [page 67](#).
- Remove bolt -2-.
- Unplug electrical connector -1-.
- Push coolant expansion tank to one side with coolant hoses -arrows- attached.



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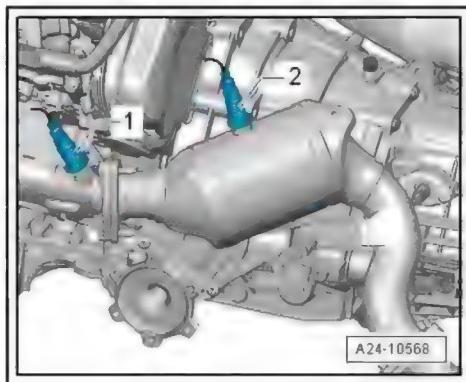
- Unplug relevant electrical connector and move electrical wiring clear.
- 1 - For Lambda probe 2 - G108-
- 2 - For Lambda probe 2 - G131- (after catalytic converter)



- Unscrew relevant Lambda probe using ring spanner -3337/7- :
- 1 - Lambda probe 2 - G108-
- 2 - Lambda probe 2 after catalytic converter - G131-



For illustration purposes, the installation position is shown with the engine removed.



Installing

Installation is carried out in reverse order; note the following:



- ◆ New Lambda probes are coated with an assembly paste.
- ◆ If re-installing the old Lambda probes, coat the threads with high-temperature paste ⇒ [Electronic parts catalogue](#).
- ◆ The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body.
- ◆ When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.

- ◆ *Fit all cable ties in the original positions when installing.*

Tightening torques

- ◆ [⇒ "8.1 Exploded view - Lambda probe", page 318](#)



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9 Engine control unit

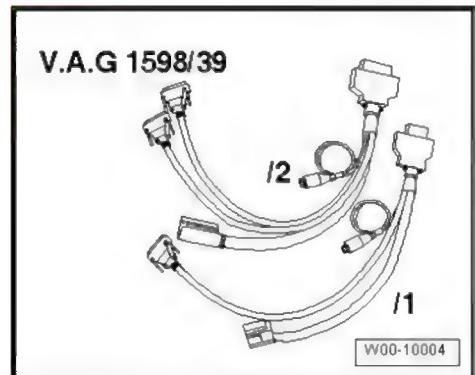
⇒ "9.1 Wiring and component check", page 323

⇒ "9.2 Removing and installing engine/motor control unit J623",
page 324

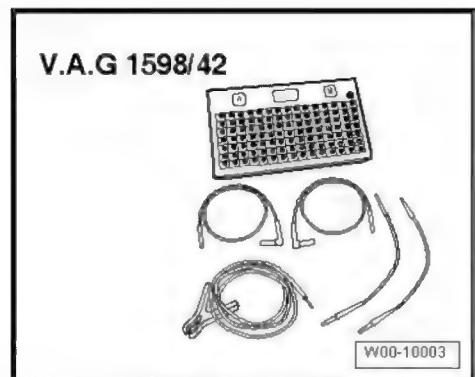
9.1 Wiring and component check

Special tools and workshop equipment required

- ◆ Adapter cable - V.A.G 1598/39-1-



- ◆ Adapter cable - V.A.G 1598/39-2-
- ◆ Test box - V.A.G 1598/42-

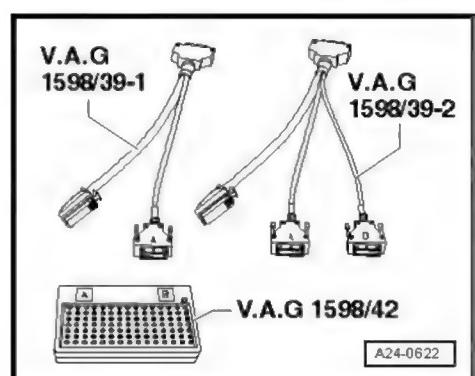


- ◆ Vehicle diagnostic tester



Note

- ◆ The test box - V.A.G 1598/42- has 105 sockets. It can be connected to the engine control unit via 2 different adapter cables.
- ◆ The engine control unit is connected to the vehicle's wiring harness via two connectors, one of which has 60 pins, the other has 94 pins.
- ◆ To carry out tests on the 60-pin wiring harness connector, the adapter cable - V.A.G 1598/39-1- is connected to connector -A- on the test box. For components connected to 60-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- ◆ To carry out tests on the 94-pin wiring harness connector, the adapter cable - V.A.G 1598/39-2- must be connected to connectors -A- and -B- on the test box. For components connected to 94-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



- ◆ The test box - V.A.G 1598/42- is designed so it can be connected both to the wiring harness for the engine control unit and to the engine control unit itself at the same time. The advantage of this is that the electronic engine control system remains fully functional when the test box is connected (for example, for measuring signals when the engine is running).
- ◆ Always use auxiliary measuring set - V.A.G 1527B- to connect test equipment (e.g. voltage tester - V.A.G 1526E- , hand-held multimeter - V.A.G 1594C- etc.).

The engine control unit has to be removed before connectors can be unplugged from engine control unit [⇒ page 324](#) .



Caution

Risk of irreparable damage to electronic components.

- ◆ Select the appropriate measuring range before connecting the test leads and observe test requirements.

- Remove engine control unit [⇒ page 324](#) .
- Connect test box - V.A.G 1598/42- to wiring harness connector. The earth clip on the test box must be connected to the negative battery terminal. The instructions for performing the individual tests indicate whether or not the engine control unit itself also needs to be connected to the test box.
- Carry out test as described in appropriate repair procedures.

Installing engine control unit

Installation is performed in the reverse sequence.

The procedure required after connecting the new engine control unit is described in the Guided Fault Finding or Guided Functions.



Note

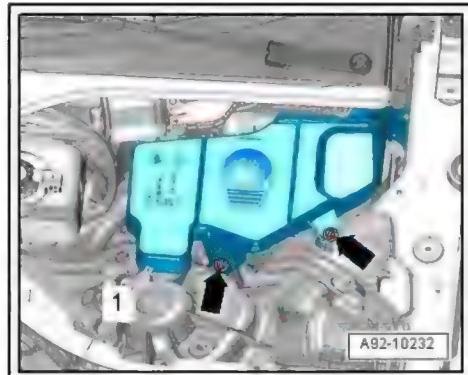
After completion of the Guided Fault Finding routine, the tester will attempt to erase the event memories of all control units. If this is not successful, the remaining events saved in the memories must be dealt with so that all event memory entries can be erased.

9.2 Removing and installing engine/motor control unit - J623-

Removing

- When renewing engine control unit, select diagnosis object "Replace engine control unit" in "Guided Functions" mode of ⇒ Vehicle diagnostic tester.
- Switch off ignition.
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .

- Unscrew bolts -arrows- and pull filler neck out of washer fluid reservoir and through opening in body to right side.



- Release catch -arrow- and detach engine control unit - J623- -item 1-.



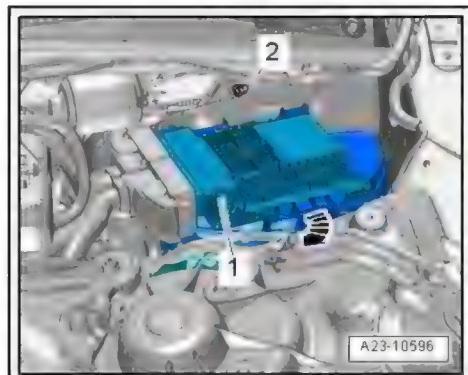
Note

Disregard -item 2-.

Installing

Installation is carried out in reverse order; note the following:

- Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Exploded view - windscreen washer system .
- Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



After installing a new engine control unit, the following operation must be performed:

- Activate engine control unit using ⇒ Vehicle diagnostic tester in "Guided Functions" mode, "Replace engine control unit".

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26 – Exhaust system

1 Exhaust pipes/silencers

- ⇒ “1.1 Exploded view - silencers”, page 326
- ⇒ “1.2 Separating exhaust pipes/silencers”, page 329
- ⇒ “1.3 Removing and installing front silencer”, page 330
- ⇒ “1.4 Stress-free alignment of exhaust system”, page 331
- ⇒ “1.5 Checking exhaust system for leaks”, page 332

1.1 Exploded view - silencers

1 - Bolt

- 20 Nm

2 - Mounting

- Renew if damaged
- Check preload ⇒ “1.4 Stress-free alignment of exhaust system”, page 331

3 - Centre silencer

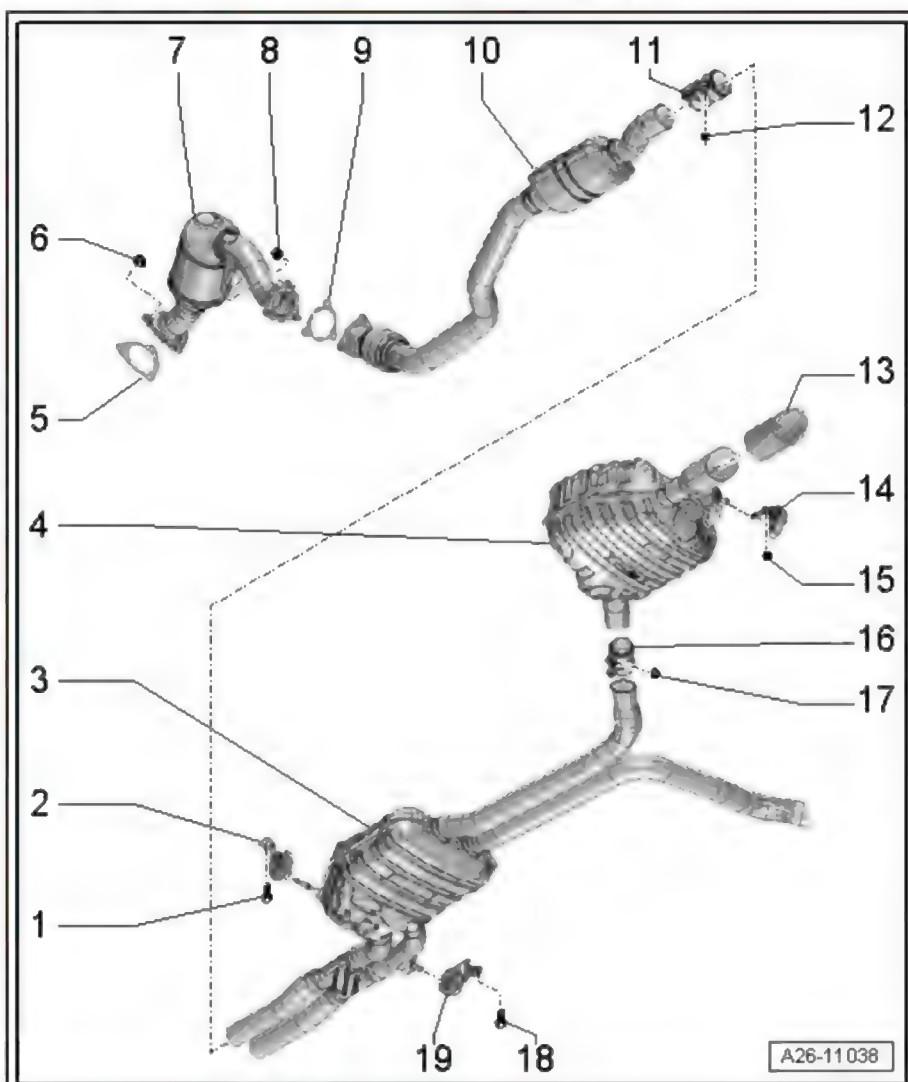
- Combined in one unit with rear silencers as original equipment. Can be renewed separately for repair purposes
- Remove diagonal struts prior to removal ⇒ Fig. “Diagonal struts (Audi A7)”, page 329
- Cutting point ⇒ “1.2 Separating exhaust pipes/silencers”, page 329
- Align exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 331

4 - Rear silencer

- Combined as one unit with centre silencer as original equipment
- Centre silencer and rear silencer can be renewed separately
- Remove diagonal struts prior to removal ⇒ Fig. “Diagonal struts (Audi A7)”, page 329
- Cutting point between centre silencer and rear silencer ⇒ “1.2 Separating exhaust pipes/silencers”, page 329
- Align exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 331

5 - Gasket

- Renew



A26-11 038

6 - Nut

- 23 Nm
- Renew

7 - Catalytic converter

- Protect against knocks and impact
- Removing and installing:

- ◆ Vehicles with 7-speed dual clutch gearbox 0B5 (left-side) ⇒ “2.1.1 Removing and installing catalytic converter (left-side) - vehicles with dual clutch gearbox”, page 334
- ◆ Vehicles with 7-speed dual clutch gearbox 0B5 (right-side) ⇒ “2.1.2 Removing and installing catalytic converter (right-side) - vehicles with dual clutch gearbox”, page 337
- ◆ Vehicles with 8-speed automatic gearbox 0BK ⇒ “2.1.3 Removing catalytic converters - vehicles with automatic gearbox”, page 340

Mounting components ⇒ Fig. “Components of mountings for catalytic converter”, page 328

8 - Nut

- 23 Nm
- Renew

9 - Gasket

- Renew

10 - Front silencer

- With flexible joint; do not bend flexible joint more than 10° – otherwise it can be damaged
- Removing and installing ⇒ “1.3 Removing and installing front silencer”, page 330
- Align exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 331

11 - Clamp (front)

- Installation position ⇒ Fig. “Installation position of front clamps”, page 328
- Push onto front silencer as far as stop
- Before tightening, align exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 331
- Tighten bolted connections evenly

12 - Nut

- 23 Nm

13 - Trim

- For tailpipe
- Slide onto tailpipe as far as stop

14 - Mounting

- Renew if damaged
- Check preload ⇒ “1.4 Stress-free alignment of exhaust system”, page 331

15 - Nut

- Renew
- 20 Nm

16 - Clamp (rear)

- For separate replacement of centre and rear silencers
- Installation position ⇒ Fig. “Installation position of rear clamps”, page 328
- Before tightening, align exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 331
- Tighten bolted connections evenly

17 - Nut

- 23 Nm

18 - Bolt

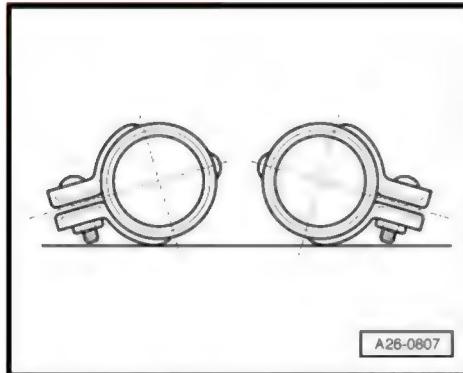
- 23 Nm

19 - Mounting

- Renew if damaged
- Check preload ⇒ [“1.4 Stress-free alignment of exhaust system”, page 331](#)

Installation position of front clamps

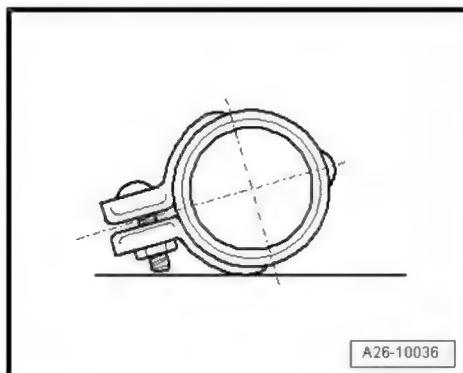
- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Installation position: bolted connections face outwards.



A26-0807

Installation position of rear clamps

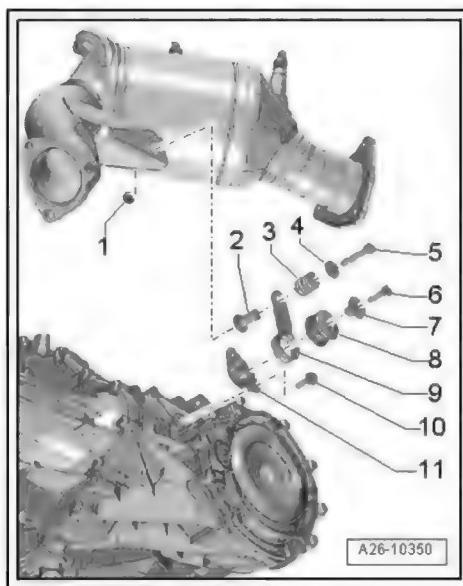
- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Installation position: bolted connections face forwards.



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Components of mountings for catalytic converter

- 1 - Nut, 23 Nm
- 2 - Spacer sleeve
- 3 - Compression spring
- 4 - Washer
- 5 - Bolt
- 6 - Bolt, 23 Nm
- 7 - Spacer sleeve
- 8 - Buffer
- 9 - Bracket
- 10 - Bolt, 23 Nm
- 11 - Bracket



A26-10350

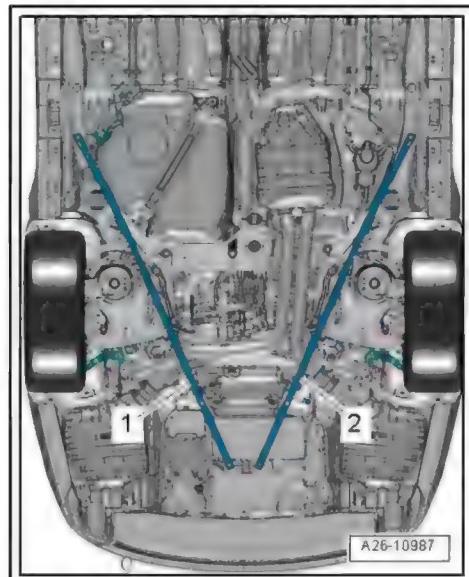


Note

The illustration shows the right-side mounting. The mountings (left-side) are symmetrically reversed.

Diagonal struts (Audi A7)

- Remove diagonal struts -1- and -2- when removing centre silencer and rear silencer unit.
- Install diagonal struts ⇒ Running gear, axles, steering; Rep. gr. 42 ; Subframe; Exploded view - subframe .



1.2 Separating exhaust pipes/silencers

- ◆ The connecting pipe can be cut through at the cutting point in order to renew the centre or rear silencer separately.
- ◆ The cutting point is marked by an indentation on the circumference of the exhaust pipe.

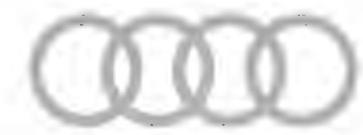
Special tools and workshop equipment required

- ◆ Chain pipe cutter - VAS 6254-

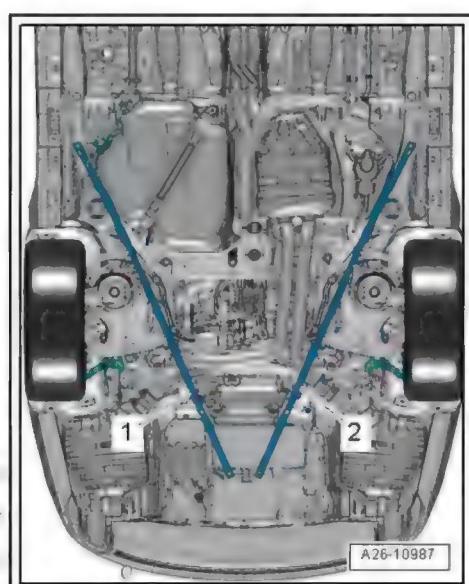


Procedure

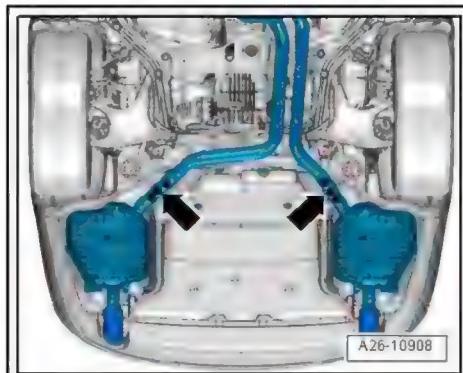
- Audi A7: Remove bolts on both sides and detach diagonal struts -1- and -2-.



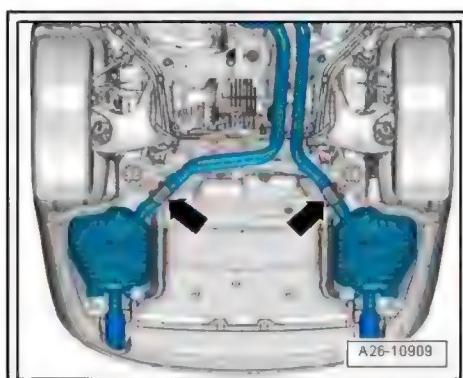
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- Cut through exhaust pipes at right angles at the positions marked -arrows- using chain pipe cutter - VAS 6254- .



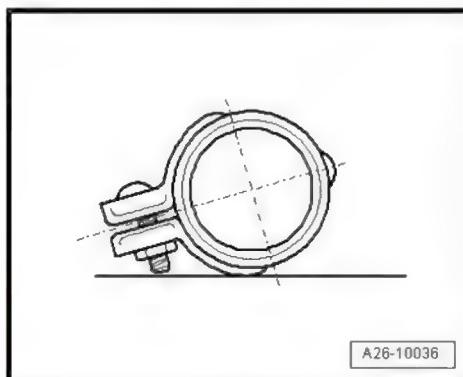
- Position centre of clamps -arrows- over cutting location.



- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Installation position: bolted connections face forwards.
- Align the exhaust system so it is free of stress ⇒ [page 331](#) .

Tightening torques

- ◆ ⇒ “1.1 Exploded view - silencers”, [page 326](#)
- ◆ Diagonal struts ⇒ Running gear, axles, steering; Rep. gr. 42 ; Subframe; Exploded view - subframe



1.3 Removing and installing front silencer

Removing

- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation.



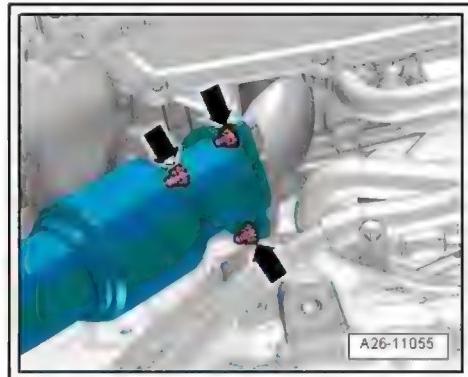
WARNING

The exhaust system can become extremely hot. This can cause injuries.

Danger of burns to hands and other parts of the body.

- Allow exhaust system to cool down.

- Unscrew nuts -arrows- for front silencer (left-side).



- Unscrew nuts -arrows- for front silencer (right-side).



Caution

Risk of damage to flexible joint if handled incorrectly.

- *Do not bend flexible joint more than 10°.*
- *Install flexible joint so that it is not under tension.*

- Release and push back clamp -1- or -2- and detach relevant front silencer.

Installing

Installation is carried out in reverse order; note the following:



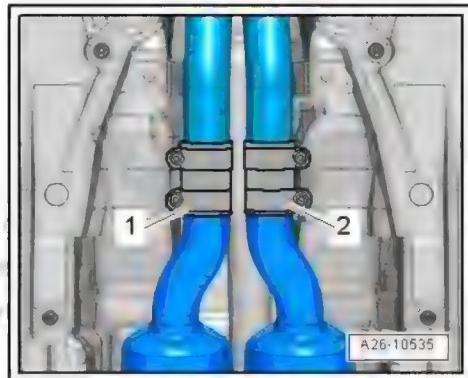
Note

Renew gaskets and self-locking nuts.

- Align the exhaust system so it is free of stress [⇒ page 331](#).

Tightening torques

- ◆ [⇒ "1.1 Exploded view - silencers", page 326](#)
- ◆ [⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation](#)



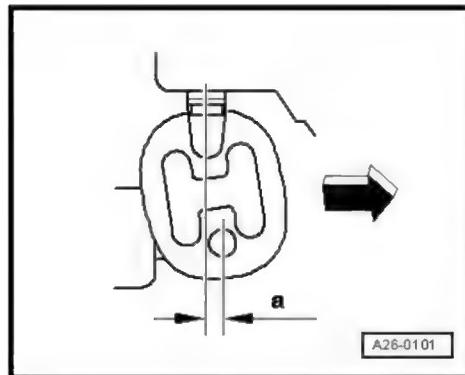
1.4 Stress-free alignment of exhaust system

Procedure

- The exhaust system must be aligned when it is cool.

Vehicles without clamps between centre silencer and rear silencers

- Loosen bolted connections on front clamps.
- Push exhaust system towards front of vehicle -arrow- until mountings in front of centre silencer are preloaded by $-a- = 6 \dots 10$ mm.
- Tighten bolted connections on clamps evenly.
- Align tailpipes [⇒ page 332](#).



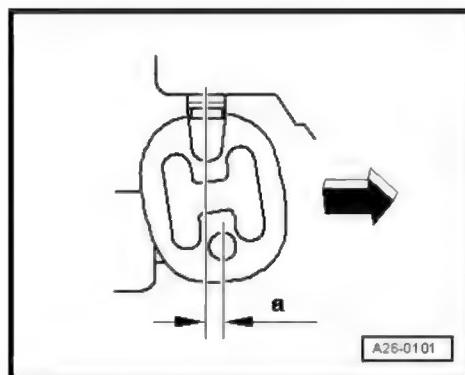
A26-0101

Vehicles with clamps between centre silencer and rear silencers

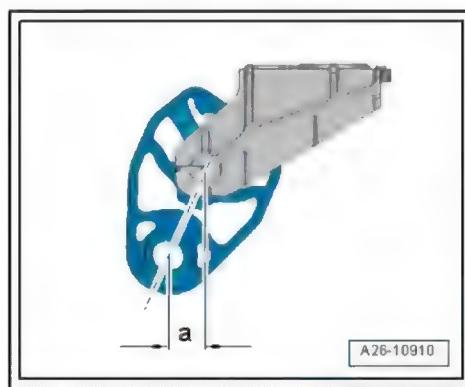


On a vehicle with clamps fitted between the centre silencer and rear silencers, it is also necessary to align the centre silencer.

- Loosen bolted connections on front and rear clamps.
- Push exhaust system towards front of vehicle -arrow- until mountings in front of centre silencer are preloaded by $-a- = 6 \dots 10$ mm.
- Tighten bolted connections on front clamps evenly.
- Push rear section of exhaust system towards front of vehicle -arrow-, so that mountings (rear) for rear silencers are preloaded by $-a- = 11 \dots 15$ mm.
- Align rear silencers so they are horizontal.
- Tighten bolted connections on rear clamps evenly.
- Align tailpipes [⇒ page 332](#).



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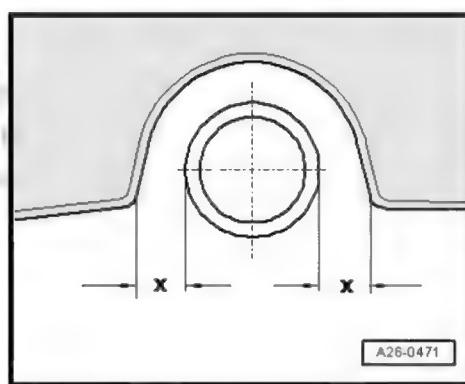
A26-10910

Aligning tailpipes

- Check clearance between tailpipes and bumper on both sides:
- Dimension $-x-$ (left-side) = dimension $-x-$ (right-side)

Tightening torques

- ◆ [⇒ "1.1 Exploded view - silencers", page 326](#)



A26-0471

1.5 Checking exhaust system for leaks

- Start the engine and run at idling speed.
- Plug tailpipes during leak test (e.g. with cloth or plugs).

- Listen for noise at connections between cylinder head/exhaust manifold, exhaust manifold/front exhaust pipe, etc. to locate any leaks.
- Rectify any leaks that are found.



2 Emission control system

⇒ [“2.1 Removing and installing catalytic converter”, page 334](#)

2.1 Removing and installing catalytic converter

⇒ [“2.1.1 Removing and installing catalytic converter \(left-side\) - vehicles with dual clutch gearbox”, page 334](#)

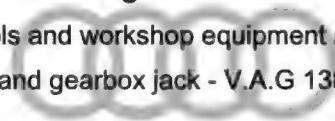
⇒ [“2.1.2 Removing and installing catalytic converter \(right-side\) - vehicles with dual clutch gearbox”, page 337](#)

⇒ [“2.1.3 Removing catalytic converters - vehicles with automatic gearbox”, page 340](#)

2.1.1 Removing and installing catalytic converter (left-side) - vehicles with dual clutch gearbox

Special tools and workshop equipment required

- ◆ Engine and gearbox jack - V.A.G 1383 A-



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- ◆ Gearbox support - T10337-



Removing



Note

Fit all cable ties in the original positions when installing.

- Remove Lambda probe 2 after catalytic converter - G131- ⇒ [page 320](#) .
- Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing sub-frame cross brace .

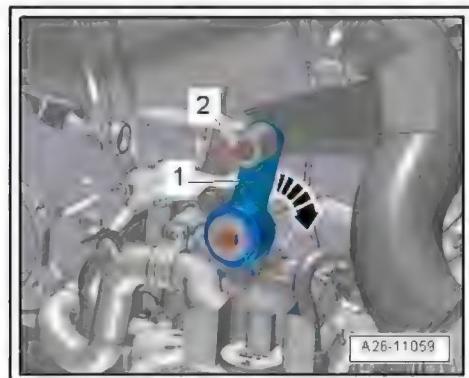
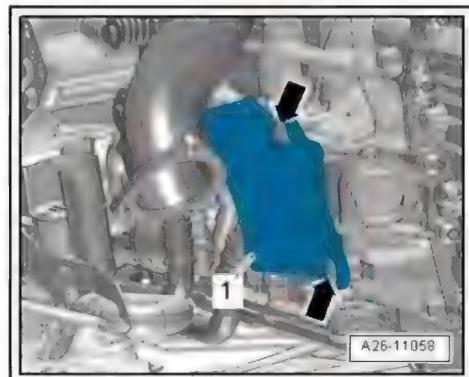


Caution

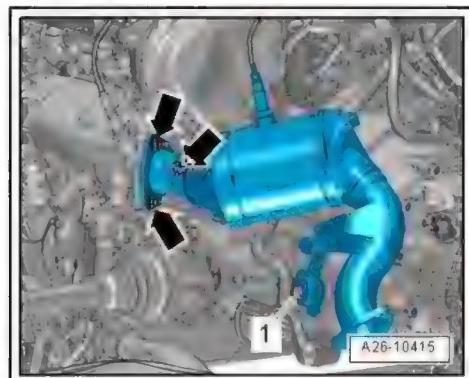
Risk of damage to running gear components.

- ◆ The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.

- Remove front silencer (left-side) ⇒ [page 330](#) .
- Remove wheel housing liner (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .
- Detach intermediate steering shaft from steering rack and move clear by sliding splines together ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .
- Unscrew bolts -arrows- and remove cover -1- from side of gearbox.



- Loosen bolted connection -2- and swivel bracket -1- to rear -arrow-.



- Remove nuts -arrows-.



Note

Disregard -item 1-.

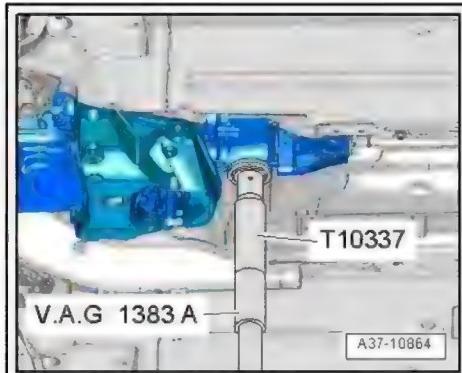
- Fit gearbox support - T10337- onto engine and gearbox jack - V.A.G 1383 A- and position underneath gearbox.
- Raise gearbox slightly using engine and gearbox jack.



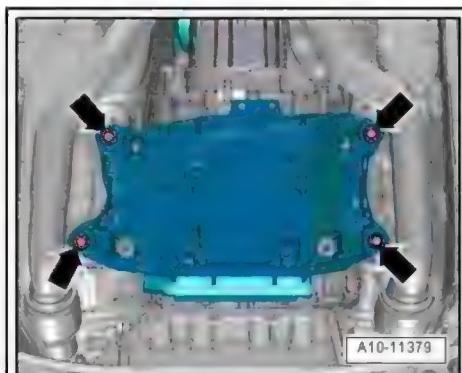
WARNING

Risk of accident.

- ◆ Engine and gearbox jack - V.A.G 1383 A- must remain in position when work is being carried out and must not be left unattended under the vehicle.

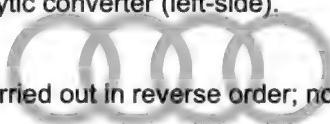


- Remove bolts -arrows- for tunnel cross member.



- Lower tunnel cross member as far as distance -a- using engine and gearbox jack - V.A.G 1383 A- .
- Dimension -a- = 70 mm (maximum).
- Detach catalytic converter (left-side).

Installing



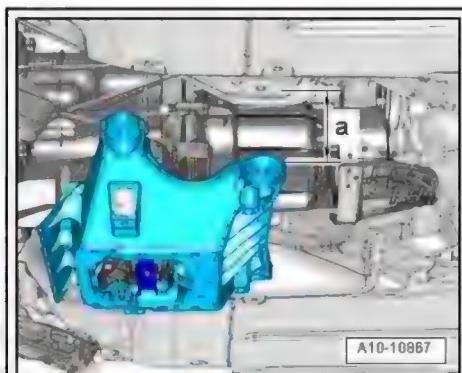
Installation is carried out in reverse order; note the following:



Note

Photographs courtesy of AUDI AG

Renew gaskets and self-locking nuts.



- Install intermediate steering shaft ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .
- Install Lambda probe 2 after catalytic converter - G131- [page 320](#) .

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - silencers”, page 326](#)
- ◆ Subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe
- ◆ Tunnel cross-piece ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ◆ Cover on gearbox ⇒ Rep. gr. 34 ; ATF circuit; Exploded view - ATF circuit

2.1.2 Removing and installing catalytic converter (right-side) - vehicles with dual clutch gearbox

Special tools and workshop equipment required

- ◆ Engine and gearbox jack - V.A.G 1383 A-



- ◆ Gearbox support - T10337-



Removing



Note

Fit all cable ties in the original positions when installing.

- Remove front silencer (right-side) ⇒ [page 330](#) .
- Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing subframe cross brace .



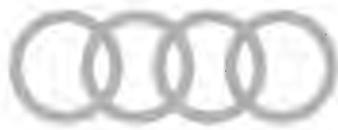
Caution

Risk of damage to running gear components.

- ◆ *The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.*

- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .
- Remove throttle valve module - J338- ⇒ [page 303](#) .
- Remove coolant pipe from right side of gearbox ⇒ [page 235](#) .

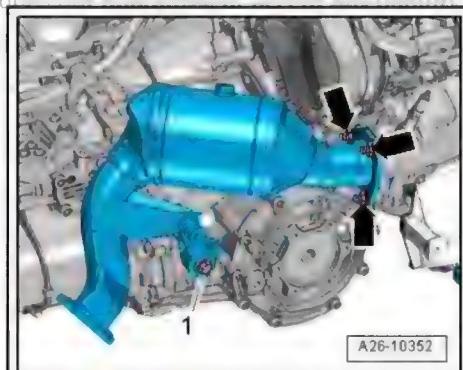
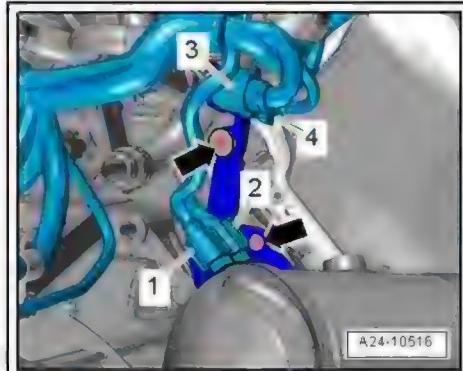
- Remove Lambda probe after catalytic converter - G130- [page 319](#).
- Detach electrical connectors -1 ... 4- from bracket.
- Unscrew bolts -arrows- and detach bracket.



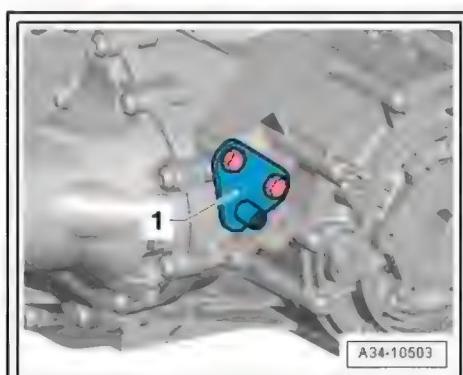
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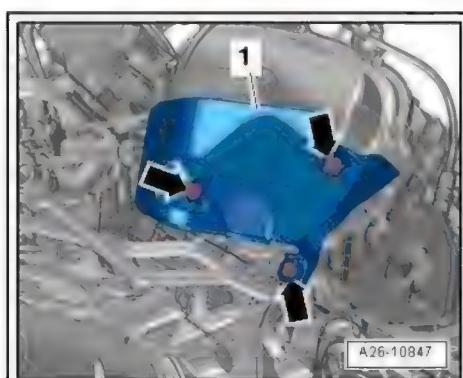
- Remove nuts -arrows- and bolt -1- and move catalytic con-
verter (right-side) towards rear.



- Remove bolts and detach retainer -1- for bracket for exhaust system.



- Remove bolts -arrows- and detach heat shield.

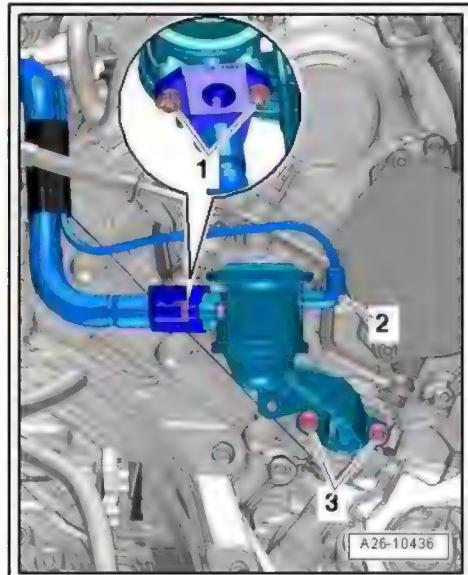


- Remove bolts -3-, detach combination valve (right-side) for secondary air system and press it to left side with secondary air hose and vacuum hose -2- connected.

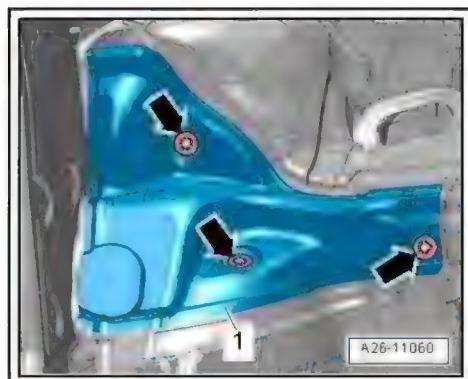


Note

Disregard -item 1-.



- Release fasteners -arrows- and detach heat shield -1- for tunnel (top right).



- Fit gearbox support - T10337- onto engine and gearbox jack - V.A.G 1383 A- and position underneath gearbox.
- Raise gearbox slightly using engine and gearbox jack.

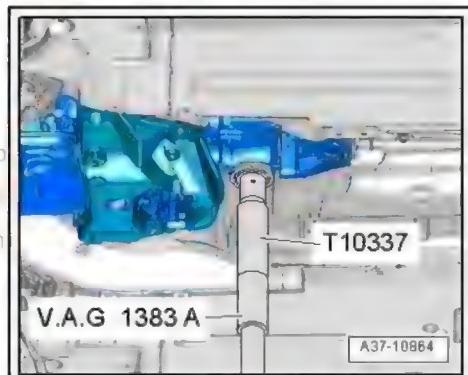


WARNING

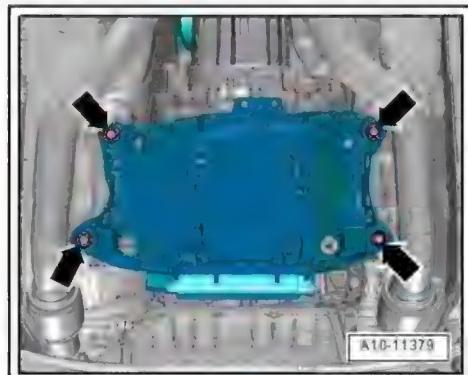
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Risk of accident.

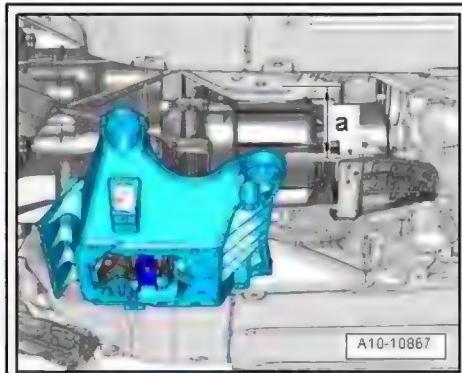
- ◆ Engine and gearbox jack - V.A.G 1383 A- must remain in position when work is being carried out and must not be left unattended under the vehicle.



- Remove bolts -arrows- for tunnel cross member.



- Lower tunnel cross member as far as distance -a- using engine and gearbox jack - V.A.G 1383 A- .
- Dimension -a- = 60 mm (maximum).



- Secure gearbox in position using retaining tool - VW 785/1 B- , as shown in illustration.
- Lift off catalytic converter (right-side).

Installing

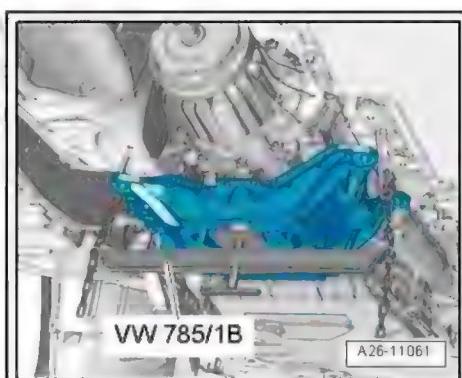
Installation is carried out in reverse order; note the following:



Note

Renew gaskets and self-locking nuts.

- Install combination valve for secondary air (right-side) ⇒ [page 351](#) .
- Install Lambda probe after catalytic converter - G130- ⇒ [page 319](#) .
- Install coolant pipe (right-side) on gearbox ⇒ [page 235](#) .
- Install throttle valve module - J338- ⇒ [page 303](#) .
- Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .



Tightening torques

- ◆ ⇒ “1.1 Exploded view - silencers”, [page 326](#)
- ◆ ⇒ Fig. “Components of mountings for catalytic converter”, [page 328](#)
- ◆ Tunnel cross-piece ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Exploded view - heat shield
- ◆ Subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe

2.1.3 Removing catalytic converters - vehicles with automatic gearbox

Special tools and workshop equipment required

- ◆ Engine and gearbox jack - V.A.G 1383 A-



- ◆ Gearbox support - T10337-



Removing



Note

Fit all cable ties in the original positions when installing.

- Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing subframe cross brace .



Caution

Risk of damage to running gear components.

- ◆ *The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.*

- Remove front silencer on relevant side [⇒ page 330](#) .
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

Catalytic converter (left-side):

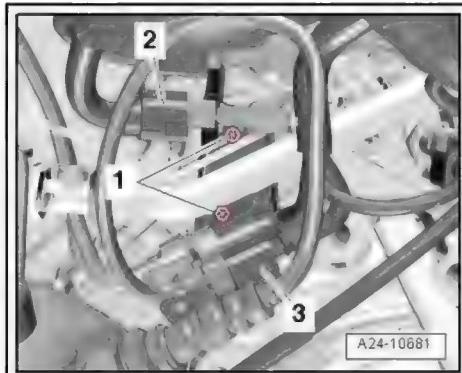
- Remove intermediate steering shaft ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .

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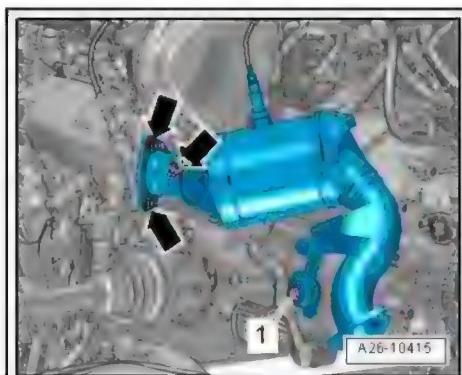
- Remove electrical connector -3- for Lambda probe 2 after catalytic converter - G131- from bracket and unplug connector.



Disregard items -1 and 2-



- Remove nuts -arrows- and bolt -1-.

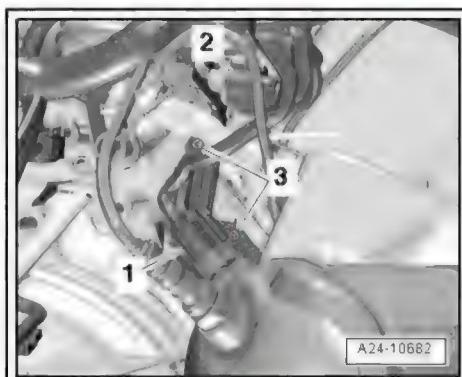


Catalytic converter (right-side):

- Remove electrical connector -1- for Lambda probe after catalytic converter - G130- from bracket and unplug connector.



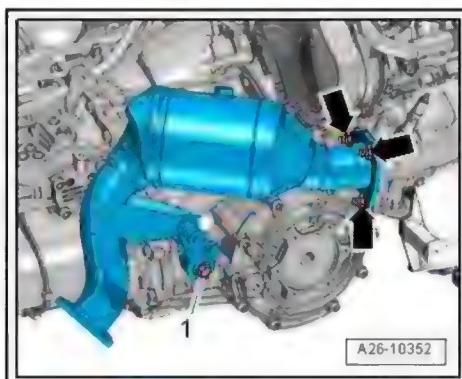
Disregard items -2 and 3-



- Remove nuts -arrows- and bolt -1- and move catalytic converter (right-side) towards rear.



Disregard -item 1-



Both sides (continued):

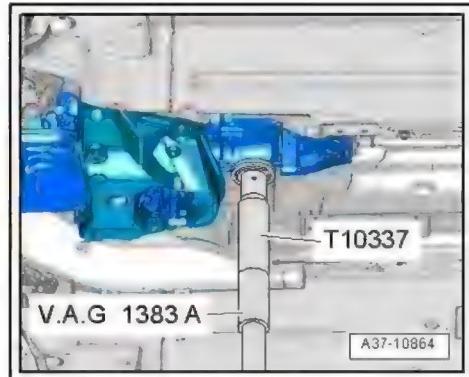
- Fit gearbox support - T10337- onto engine and gearbox jack - V.A.G 1383 A- and position underneath gearbox.
- Raise gearbox slightly using engine and gearbox jack.



WARNING

Risk of accident.

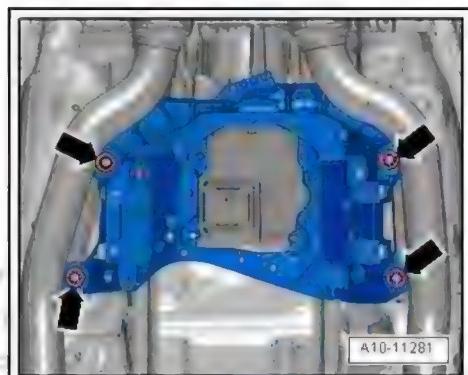
- ◆ **Engine and gearbox jack - V.A.G 1383 A- must remain in position when work is being carried out and must not be left unattended under the vehicle.**



- Remove bolts -arrows- for tunnel cross member.



Werkstattleitlinien für die Montage des unteren Längsträgers
 Montageanleitung ausgestellt von AUDI AG; 6L0H WZ
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- Lower tunnel cross member as far as distance -a- using engine and gearbox jack - V.A.G 1383 A- .
- Dimension -a- = 70 mm (maximum).
- Detach catalytic converter on relevant side.

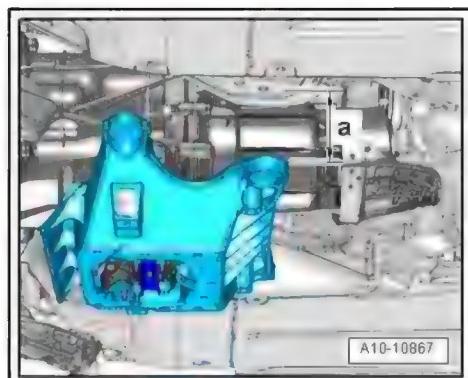
Installing

Installation is carried out in reverse order; note the following:



Note

Renew gaskets and self-locking nuts.



- Install intermediate steering shaft ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .
- Install front silencers ⇒ [page 330](#) .

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - silencers”, page 326](#)
- ◆ Tunnel cross-piece ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings
- ◆ Subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe

3 Secondary air system

⇒ "3.1 Exploded view - secondary air system", page 344

⇒ "3.2 Removing and installing secondary air pump motor V101", page 346

⇒ "3.3 Checking combination valve", page 347

⇒ "3.4 Removing and installing combination valve", page 348

⇒ "3.5 Removing and installing sender 1 for secondary air pressure G609", page 353

3.1 Exploded view - secondary air system

Secondary air pump motor - V101-

1 - Secondary air pump motor - V101-

- Fitting location: At front right of engine compartment below longitudinal member
- Removing and installing ⇒ "3.2 Removing and installing secondary air pump motor V101", page 346
- Check in Guided Fault Finding ⇒ Vehicle diagnostic tester

2 - Bolt

- 9 Nm

3 - Bonded rubber bush

- 3x

4 - Bracket

- For secondary air pump motor - V101-

5 - Nut

- 9 Nm

6 - Hose

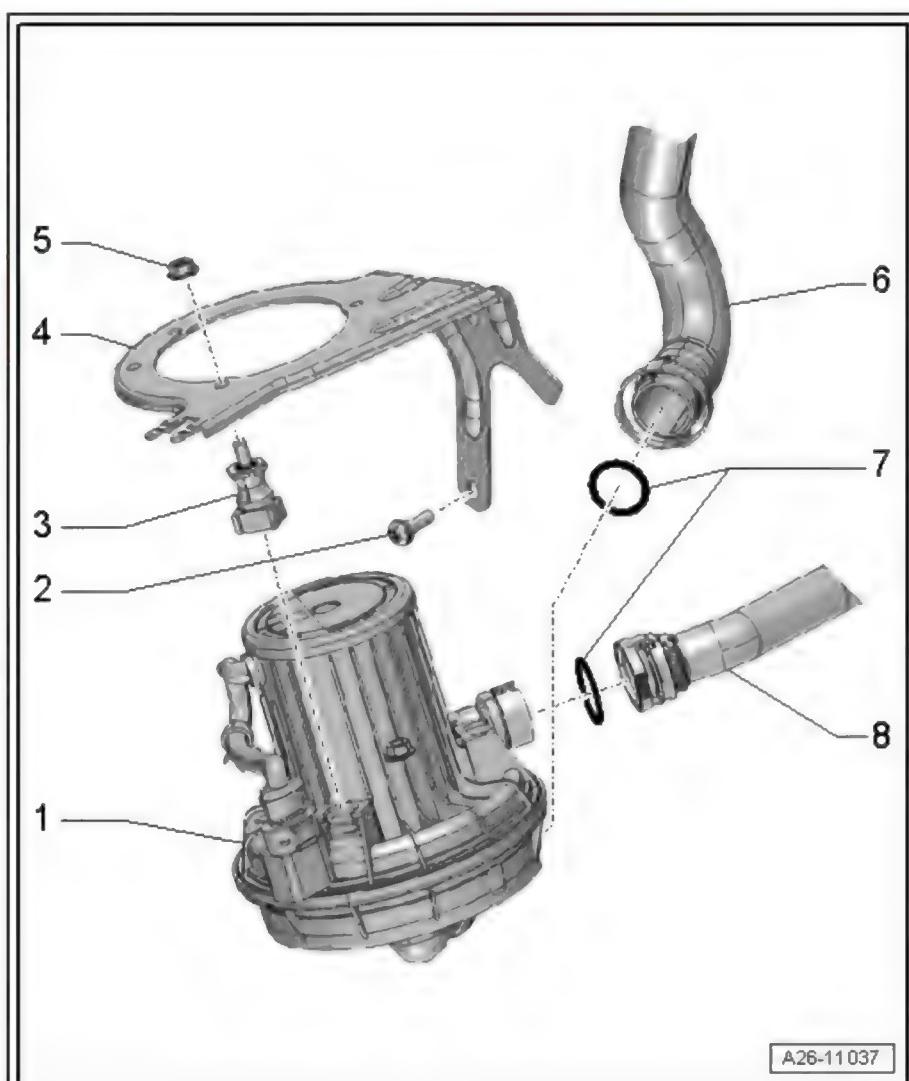
- For secondary air
- From air cleaner

7 - O-rings

- Renew

8 - Hose

- For secondary air
- To combination valves for secondary air inlet



A26-11037

Combination valves for secondary air system

1 - Hose

- From secondary air pump motor - V101-

2 - Gasket

- Renew

3 - Bolts

- 9 Nm

4 - Vacuum hose

5 - Combination valve for secondary air system (right-side)

- Check operation and check for leaks ⇒ ["3.3 Checking combination valve", page 347](#)
- Removing and installing ⇒ ["3.4.2 Removing and installing combination valve \(right-side\)", page 351](#)

6 - Bolt

- 9 Nm

7 - O-ring

- Renew

8 - Sender 1 for secondary air pressure - G609-

- Fitted on some USA vehicles
- Removing and installing ⇒ ["3.5 Removing and installing sender 1 for secondary air pressure G609", page 353](#)

9 - Bolt

- 9 Nm

10 - Combination valve for secondary air system (left-side)

- Check operation and check for leaks ⇒ ["3.3 Checking combination valve", page 347](#)
- Removing and installing ⇒ ["3.4.1 Removing and installing combination valve \(left-side\)", page 348](#)

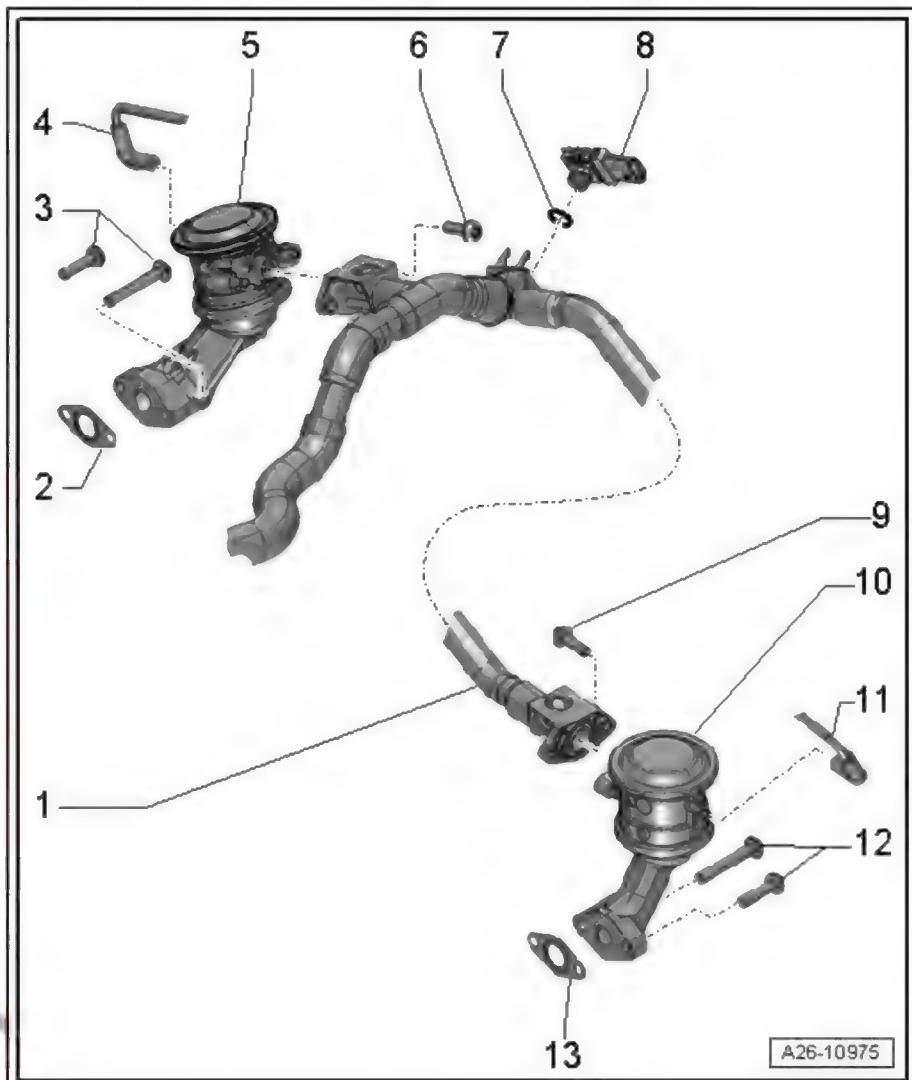
11 - Vacuum hose

12 - Bolts

- 9 Nm

13 - Gasket

- Renew



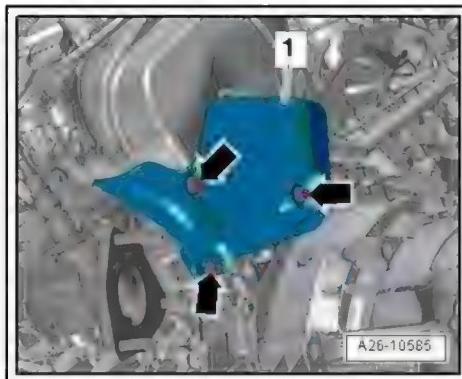
Heat shield for combination valve for secondary air system - tightening torque

- Tighten bolts -arrows- for heat shield -1- to 9 Nm.



Note

The illustration shows the heat shield on the left side of the vehicle.



3.2 Removing and installing secondary air pump motor - V101-

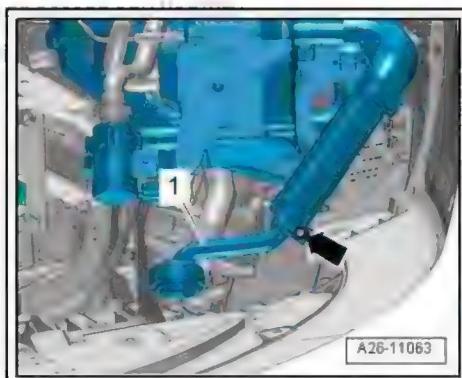
Removing



Note

Fit all cable ties in the original positions when installing.

- Remove wheel spoiler (front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front).
- Vehicles with auxiliary heater: Release clamp -arrow- and swivel exhaust pipe for auxiliary heater -1- to rear.
- Remove air intake grille (right-side) from bottom section of bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .



- Unplug electrical connector -4- at secondary air pump motor - V101- .
- Press release tabs and detach secondary air hoses -1- and -2-.
- Remove nuts -3- and detach secondary air pump.

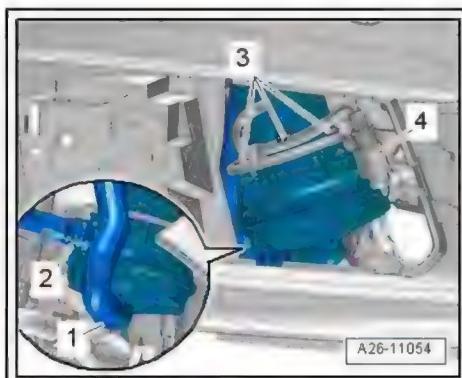
Installing

Installation is carried out in reverse order; note the following:



Note

Fit new O-rings.



Tightening torques

- ◆ ⇒ "3.1 Exploded view - secondary air system", page 344

- ◆ Wheel spoiler ⇒ General body repairs, exterior; Rep. gr. 66 ;
 Wheel housing liners; Exploded view - wheel housing liner
 (front)

3.3 Checking combination valve

Special tools and workshop equipment required

- ◆ Hand vacuum pump - VAS 6213-



Detailed information on the repair of your vehicle can be found in the Audi A6/A7/A7 Sportback repair manual.
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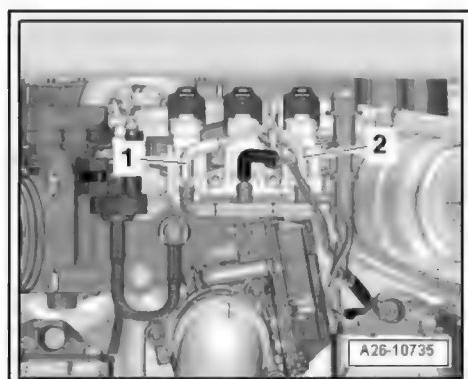
W00-11210

Procedure

- Vacuum hoses and hose connections do not leak.
- Vacuum hoses are not clogged.
- Remove engine cover panels ⇒ [page 67](#).

Version with two secondary air inlet valves

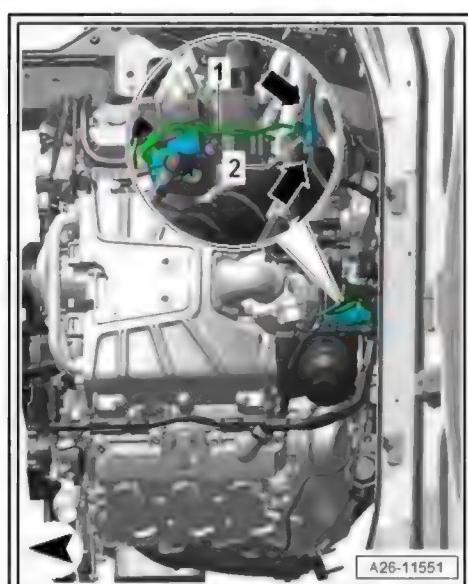
- Detach vacuum hose -1- or -2- from combination valve to be checked.



A26-10735

Version with one secondary air inlet valve

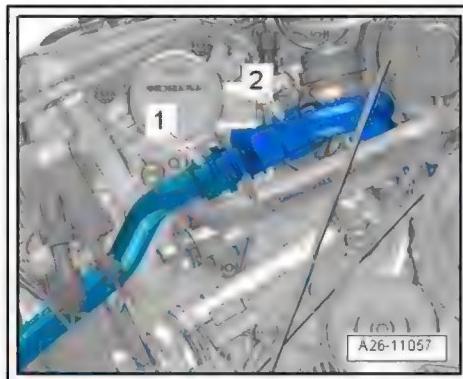
- Follow routing of vacuum hose -1- from secondary air inlet valve downwards to T-piece -2-.
- Detach vacuum hose -arrow- from T-piece -2- for combination valve to be checked.



A26-11551

All vehicles (continued)

- Connect hand vacuum pump - VAS 6213- to vacuum hose of combination valve to be checked.
- Release clip -2- and move secondary air hose clear.
- Press release tabs and detach secondary air hose -1- from bracket towards front.
- Blow lightly into secondary air hose with your mouth (do not use compressed air).
- The combination valves for secondary air should be closed; it should not be possible to blow through the hose.
- Operate hand vacuum pump.
- The combination valve should open; it should now be possible to blow through the hose.



It is necessary to overcome slight initial resistance before it is possible to blow through the hose.

- Renew combination valve for secondary air system if it does not open: left-side [⇒ page 348](#), right-side [⇒ page 351](#).

Assembling

Installation is carried out in the reverse order; note the following:



Fit new O-ring.

3.4 Removing and installing combination valve

[⇒ “3.4.1 Removing and installing combination valve \(left-side\)”](#),
[page 348](#)

[⇒ “3.4.2 Removing and installing combination valve \(right-side\)”](#),
[page 351](#)

3.4.1 Removing and installing combination valve (left-side)

Removing



Fit all cable ties in the original positions when installing.

- Remove front silencer (left-side) [⇒ page 330](#).
- Remove body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
- Remove wheel housing liner (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

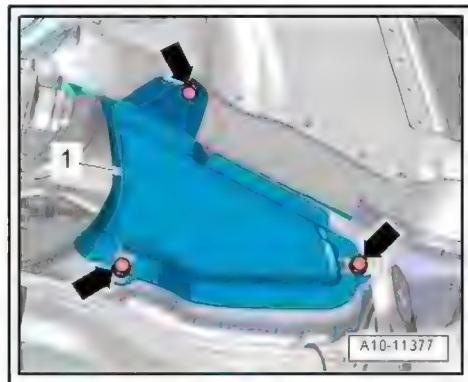
- Remove bolts -arrows- and detach heat shield (left-side) -1- on subframe.



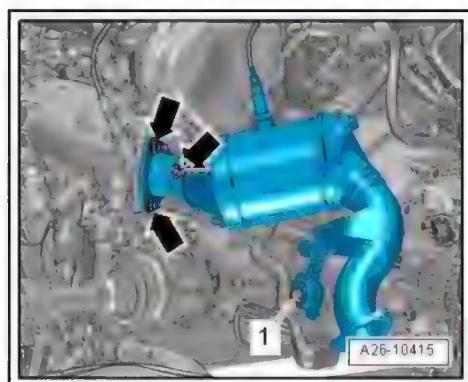
Caution

Risk of irreparable damage to electronic components.

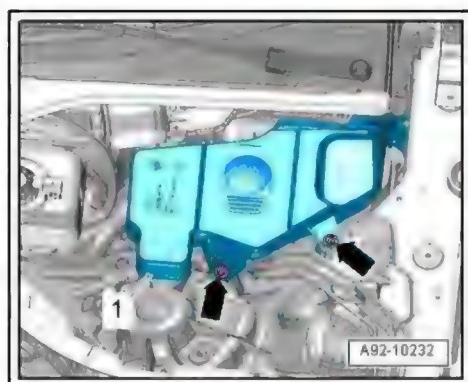
◆ *Observe notes on procedure for disconnecting the battery.*



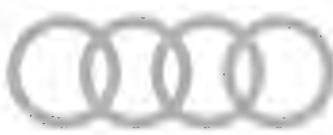
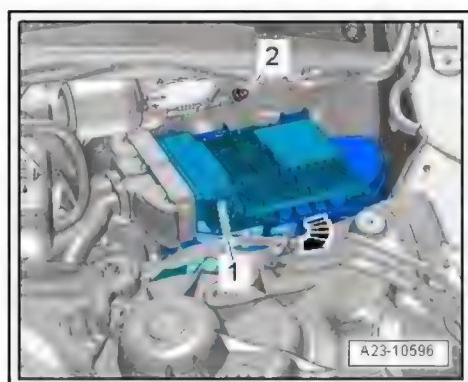
- Switch off ignition and remove ignition key.
- Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
- Move clear electrical wiring for Lambda probe 2 after catalytic converter - G131- .
- Remove bolt -1- and nuts -arrows-, detach catalytic converter (left-side) from exhaust manifold and move to rear.



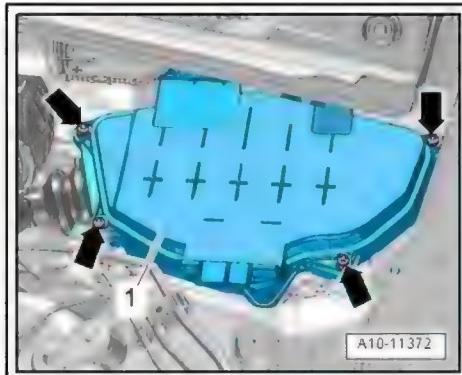
- Unscrew bolts -arrows- and pull filler neck -1- out of washer fluid reservoir and through opening in body to right side.



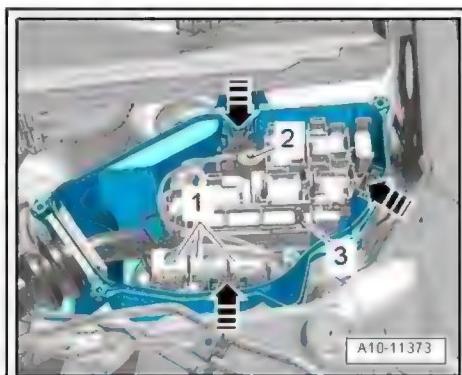
- Remove cap nut -2- and move earth wiring clear.
- Release fastener -arrow-, detach engine control unit - J623- -item 1- from bracket and swivel it to one side.



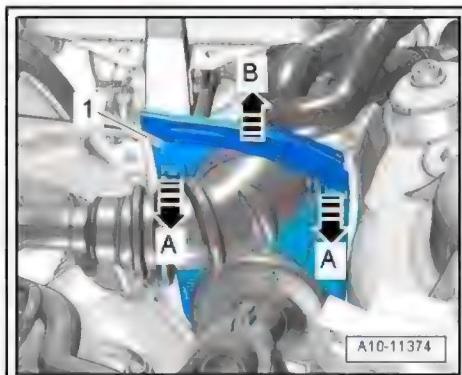
- Remove bolts -arrows- and detach cover -1- for electronics box in plenum chamber.



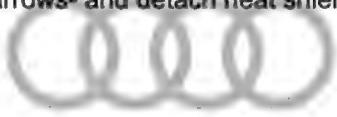
- Unplug electrical connectors -1- and unscrew nut -2- for electrical wiring.
- Release catches -arrows- and detach relay carrier with fuse holder -3-.
- Disengage engine wiring harness at electronics box in plenum chamber and move clear.



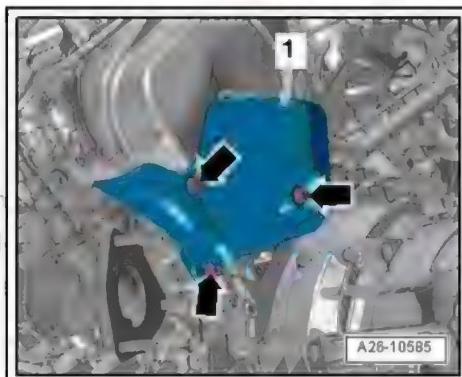
- Release catches -arrows A- and lift off wiring protector -1- -arrow B-.
- Move clear wiring harness and press to one side.



- Remove bolts -arrows- and detach heat shield -1-.



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document.



- Remove bolts -3- for secondary air system hose.
- Detach vacuum hose -2- from combination valve for secondary air system.
- Unscrew bolts -1- and detach combination valve for secondary air system.

Installing

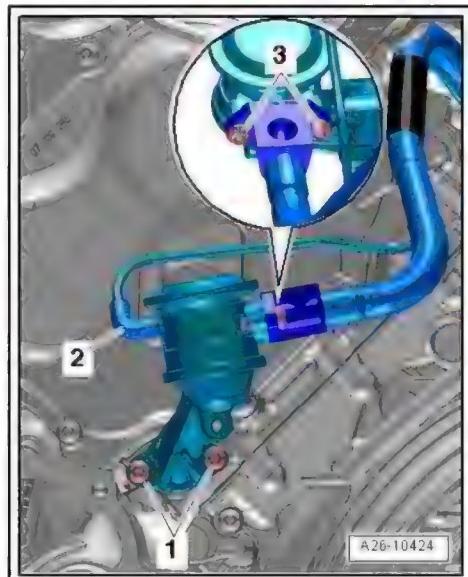
Installation is carried out in reverse order; note the following:



Note

Renew gasket.

- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install engine control unit - J623- [⇒ page 324](#).
- Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Exploded view - windscreen washer system .
- Install catalytic converter (left-side) [⇒ page 334](#).
- Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .



Tightening torques

- ◆ ⇒ “3.1 Exploded view - secondary air system”, [page 344](#)
- ◆ ⇒ Fig. “Heat shield for combination valve for secondary air system - tightening torque”, [page 346](#)
- ◆ ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Exploded view - heat shield
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ◆ Body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links

3.4.2 Removing and installing combination valve (right-side)

Removing



Note

Fit all cable ties in the original positions when installing.

- Remove front silencer (right-side) [⇒ page 330](#).
- Remove wheel housing liner (front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front).

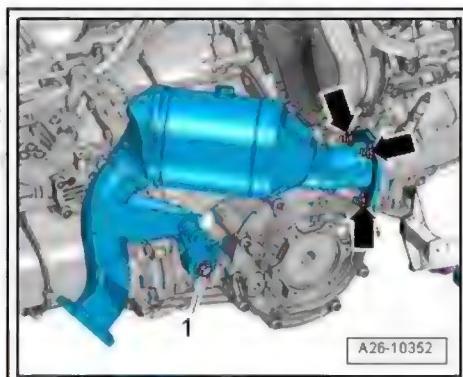
- Remove bolts -arrows- and detach heat shield (right-side)
-1- on subframe.



- Move clear electrical wiring for Lambda probe 2 after catalytic converter - G131- .

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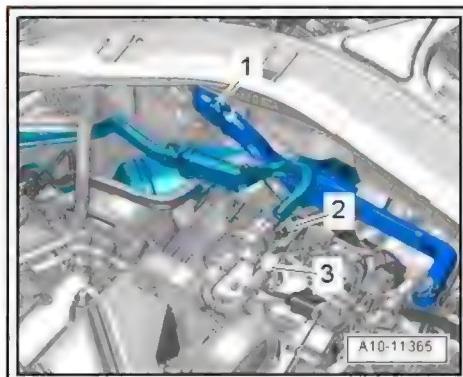
- Remove bolt -1- and nuts -arrows-, detach catalytic converter (right-side) from exhaust manifold and move to rear.
- Remove throttle valve module - J338- [≥ page 303](#).



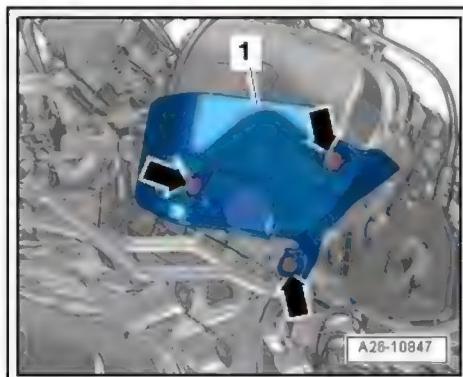
- Unplug electrical connector -2- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -3- (press release tabs).
- Take activated charcoal filter solenoid valve 1 - N80- out of bracket and move to side with hose attached.



Disregard -item 1-.



- Remove bolts -arrows- and detach heat shield -1-.



- Detach vacuum hose -2- from combination valve for secondary air system.
- Remove bolts -3- and detach combination valve (right-side) for secondary air system and bolts -1- for secondary air hose.

Installing

Installation is carried out in reverse order; note the following:

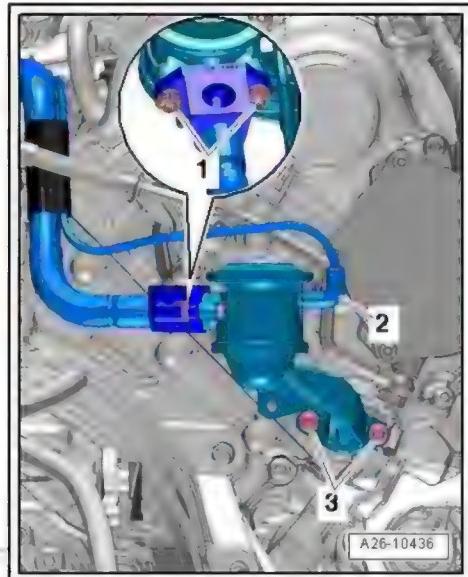


Renew gasket.

- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install throttle valve module - J338- [⇒ page 303](#).
- Install catalytic converter (right-side) [⇒ page 337](#).

Tightening torques

- ◆ [⇒ "3.1 Exploded view - secondary air system", page 344](#)
- ◆ [⇒ Fig. "Heat shield for combination valve for secondary air system - tightening torque", page 346](#)
- ◆ [⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Exploded view - heat shield](#)
- ◆ [⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner \(front\)](#)



3.5 Removing and installing sender 1 for secondary air pressure - G609-

Removing

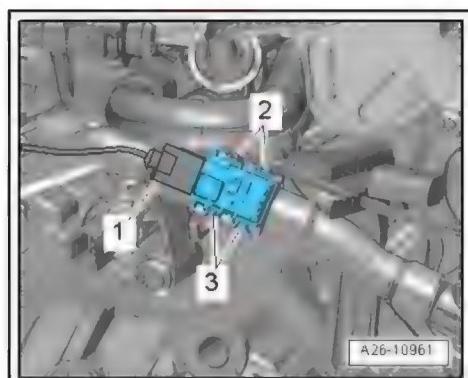
- Unplug electrical connector -1-.
- Release catches -2 and 3- and detach sender 1 for secondary air pressure - G609- .

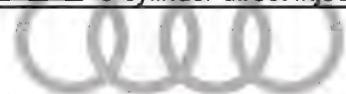
Installing

Installation is carried out in reverse order; note the following:



Fit new O-ring.





4 Exhaust manifolds

⇒ "4.1 Exploded view - exhaust manifold", page 354

⇒ "4.2 Removing and installing exhaust manifolds", page 355

With respect to the applicable regulations, please note the notes on the removal and installation of the exhaust system by Audi AG.

4.1 Exploded view - exhaust manifold

1 - Nut

- Renew
- Coat thread with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- Tightening torque and tightening sequence: left-side ⇒ [page 355](#); right-side ⇒ [page 355](#)

2 - Bracket for heat shield

3 - Exhaust manifold

- Removing and installing: left-side ⇒ [page 355](#), right-side ⇒ [page 358](#)

4 - Gasket

- Renew

5 - Bolt

- 9 Nm

6 - Heat shield

7 - Washer

8 - Bolt

- 9 Nm

9 - Lambda probe

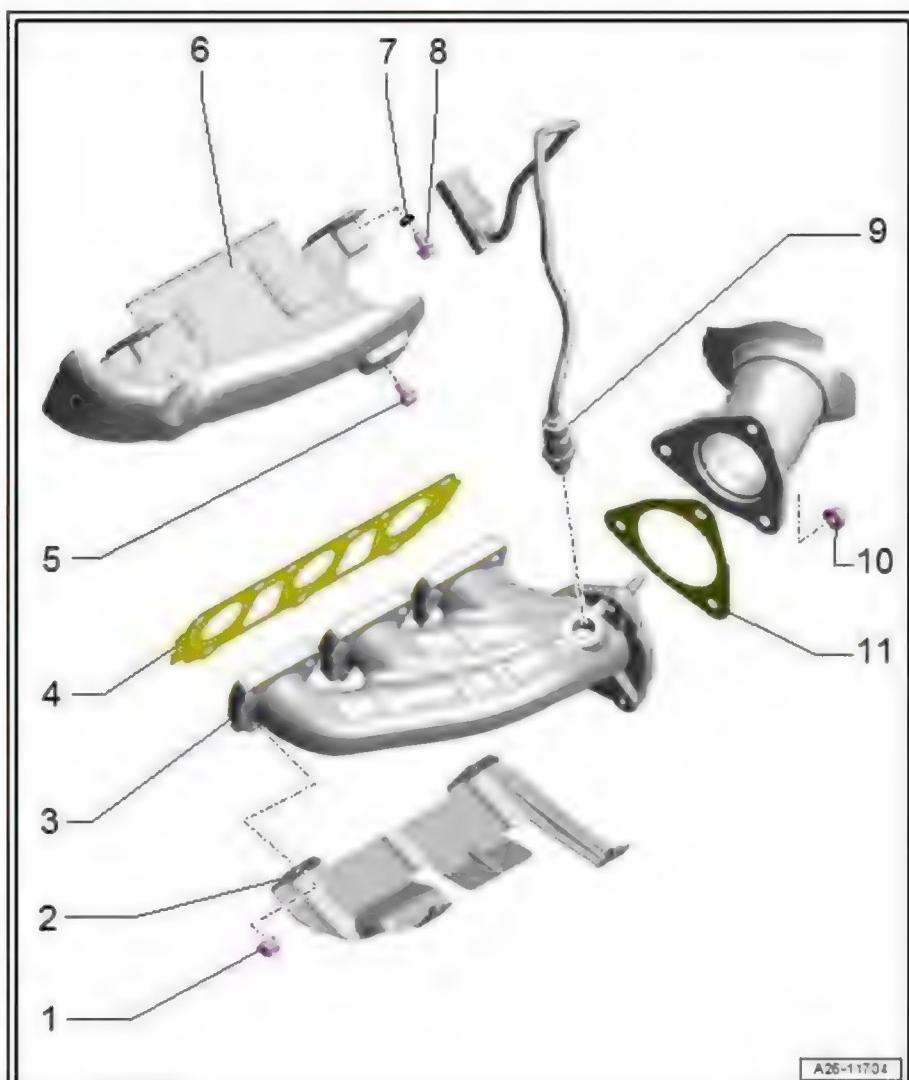
- Before catalytic converter
- Removing and installing ⇒ [page 320](#)

10 - Nut

- Renew
- Coat thread with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- 23 Nm

11 - Gasket

- Renew



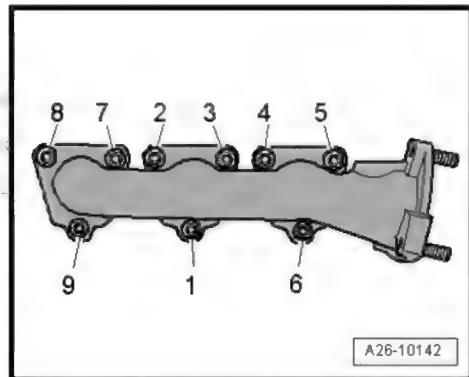
Exhaust manifold (left-side) - tightening torque and sequence



Note

- ◆ Renew nuts.
- ◆ Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ *Electronic parts catalogue*.
- Tighten nuts in 3 stages in the sequence shown:

Stage	Nuts	Tightening torque
1.	-1 ... 9-	Screw in by hand until contact is made
2.	-1 ... 9-	15 Nm
3.	-1 ... 9-	25 Nm



A26-10142

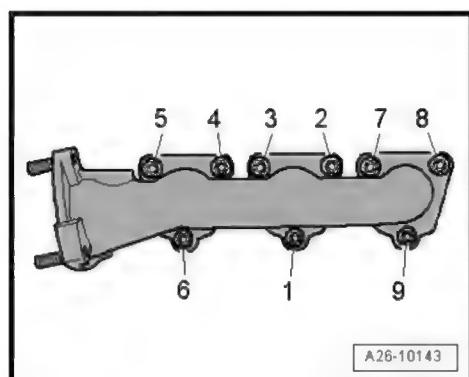
Exhaust manifold (right-side) - tightening torque and sequence



Note

- ◆ Renew nuts.
- ◆ Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ *Electronic parts catalogue*.
- Tighten nuts in 3 stages in the sequence shown:

Stage	Nuts	Tightening torque
1.	-1 ... 9-	Screw in by hand until contact is made
2.	-1 ... 9-	15 Nm
3.	-1 ... 9-	25 Nm



A26-10143

4.2 Removing and installing exhaust manifolds

⇒ "4.2.1 Removing and installing exhaust manifold (left-side)",
 page 355

⇒ "4.2.2 Removing and installing exhaust manifold (right-side)",
 page 358

4.2.1 Removing and installing exhaust manifold (left-side)

Removing

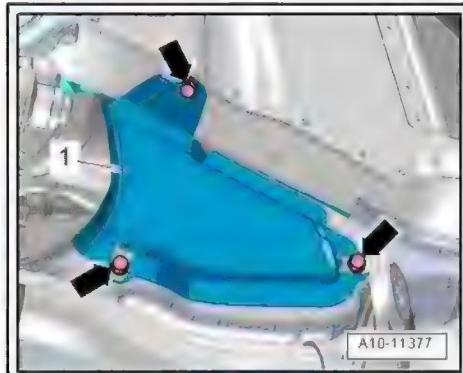


Note

Fit all cable ties in the original positions when installing.

- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Detach poly V-belt from air conditioner compressor ⇒ "1.2.2 Removing and installing poly V-belt for ancillaries",
 page 73 .

- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .
- Remove bolts -arrows- and detach heat shield (left-side) -1- on subframe.

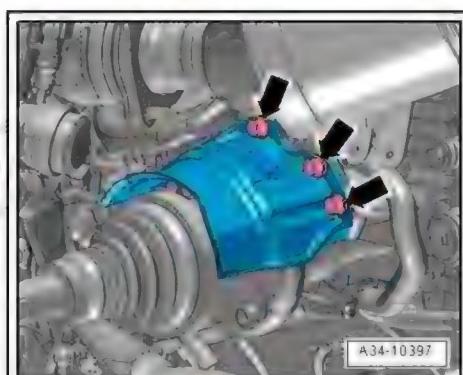


- Remove bolts -arrows- and detach heat shield for drive shaft (left-side).

- Unbolt drive shaft (left-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft

permitted to be carried out by AUDI AG. AUDI AG does not accept responsibility for damage resulting from unauthorized work.

with respect to the correctness of information contained in this document. Safety instructions must be observed.



Caution

Risk of damage to flexible joint if handled incorrectly.

- *Do not bend flexible joint more than 10°.*
- *Install flexible joint so that it is not under tension.*

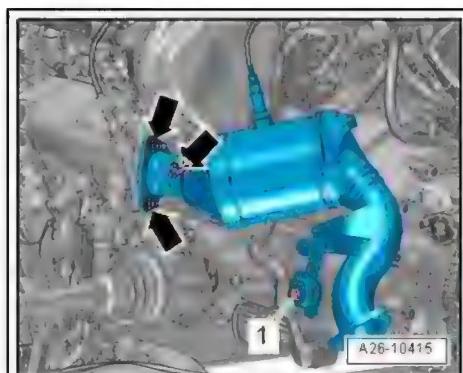
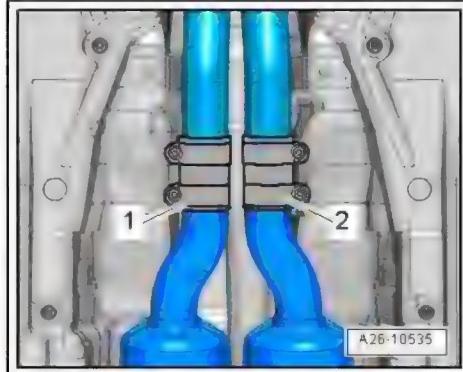
- Loosen and push back clamp -1- and tie up front silencer (left-side).



Note

Disregard -item 2-.

- Remove bolt -1- and nuts -arrows- and push catalytic converter (left-side) towards rear of vehicle.



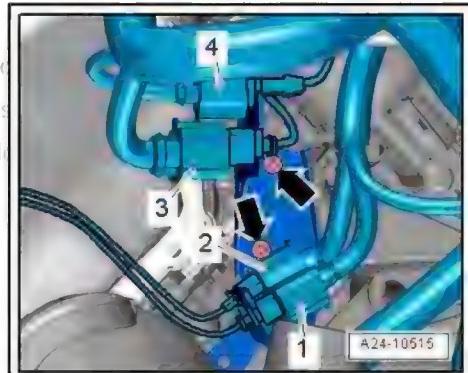
- Take electrical connector -2- for Lambda probe 2 - G108- out of bracket, unplug and move wiring clear.

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 responsibility with respect to the correctness of information in this document.

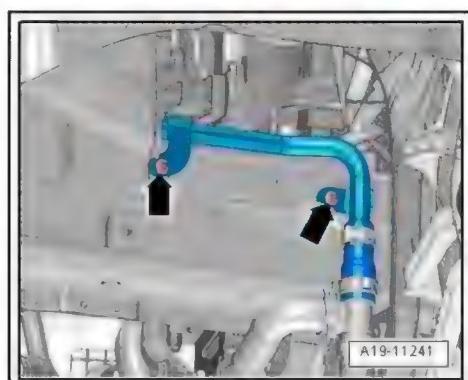


Note

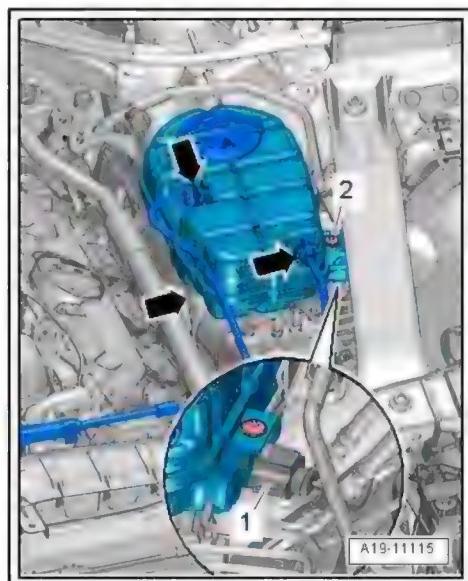
Disregard -items 1, 2, 3, 4- and -arrows-.



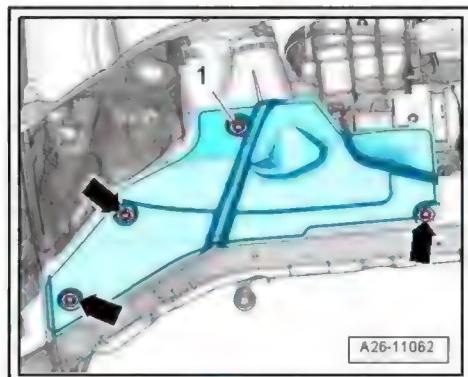
- Unscrew nuts -arrows- and move clear coolant pipe on longitudinal member.



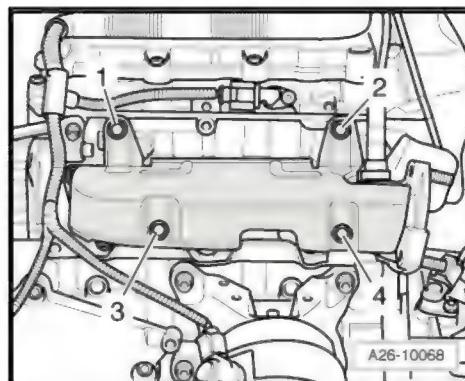
- Unplug electrical connector -1-.
- Remove bolt -2- and push coolant expansion tank to side with coolant hoses -arrows- connected.



- Release fasteners -1- and -arrows- and detach heat shield from longitudinal member (left-side).



- Remove bolts -1 ... 4- and detach heat shield.



- Remove nuts -1- and -8- and detach bracket for heat shield.
- Remove nuts -2 ... 7- and -9- and detach exhaust manifold.

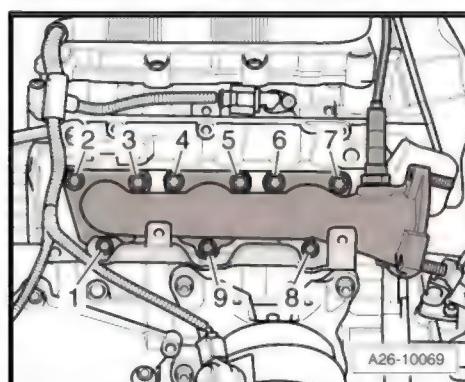
Installing

Installation is carried out in reverse order; note the following:



Note

- ◆ Renew gasket and self-locking nuts.
 - ◆ Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ *Electronic parts catalogue*.
- Fit exhaust manifold with gasket for catalytic converter and tighten nuts ⇒ [page 355](#).
 - Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
 - Install catalytic converter (left-side) ⇒ [page 334](#).
 - Install poly V-belt ⇒ [page 73](#).



Tightening torques

- ◆ ⇒ [Fig. "Exhaust manifold \(left-side\) - tightening torque and sequence"](#), [page 355](#)
- ◆ ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Exploded view - heat shield
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation
- ◆ ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit

4.2.2 Removing and installing exhaust manifold (right-side)

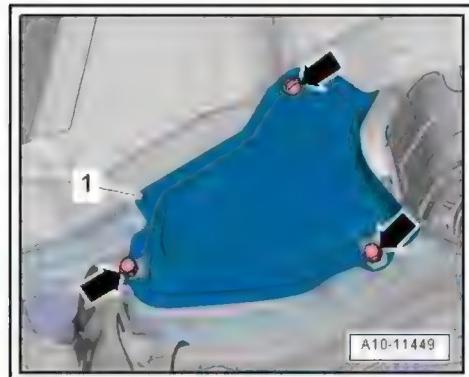
Removing



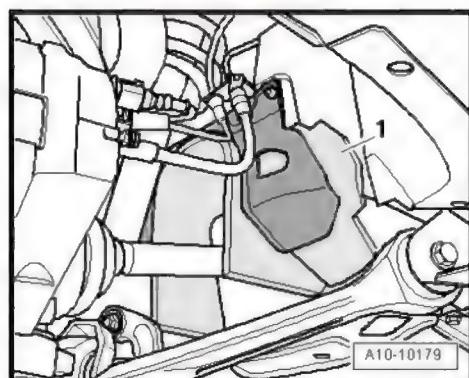
Note

Fit all cable ties in the original positions when installing.

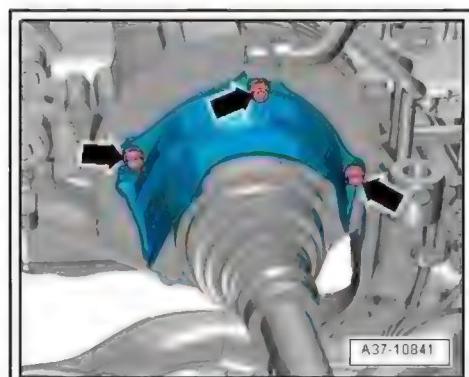
- Drain coolant [⇒ page 205](#).
- Also remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation.
- Remove air cleaner housing [⇒ page 295](#).
- Remove Lambda probe - G39- [⇒ page 319](#).
- Remove bolts -arrows- and detach heat shield (right-side)
-1- on subframe.



- Remove front wheel (right-side) ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .
- Remove cover -1- for drive shaft in wheel housing (right-side).



- Remove bolts -arrows- and detach heat shield for drive shaft (right-side).
- Unbolt drive shaft (right-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .



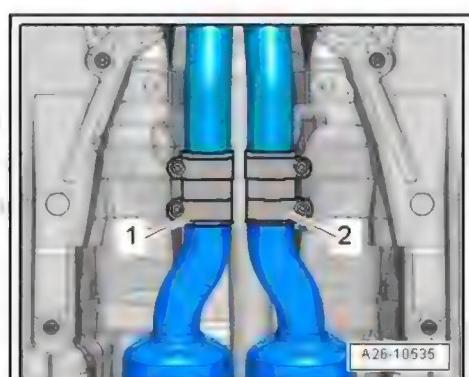
Caution

Risk of damage to flexible joint if handled incorrectly.

permitted unless explicitly used by AUDI AG. AUDI AG declines all responsibility with respect to the correctness of information in this document.

- **Do not bend flexible joint more than 10°.**
- **Install flexible joint so that it is not under tension.**

- Loosen and push back clamp -2- and tie up front silencer (right-side).

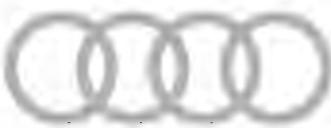




Disregard -item 1-.

Vehicles without auxiliary heater:

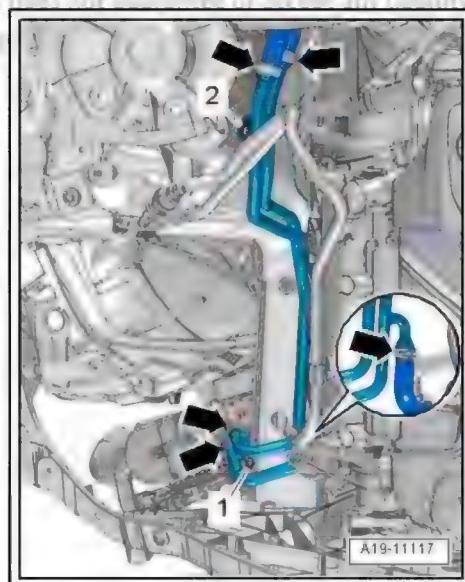
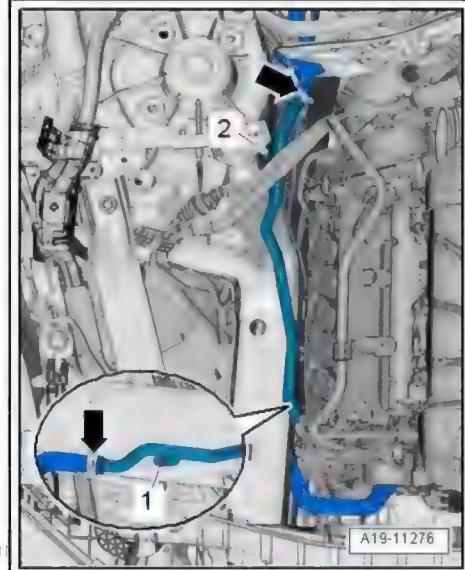
- Remove bolts -1, 2-.
- Release hose clips -arrows-, disconnect coolant hoses from coolant pipe at longitudinal member (right-side) and detach coolant pipe.



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Vehicles with auxiliary heater:

- Loosen nut -1- and remove bolt -2-.
- Release hose clips -arrows-, disconnect coolant hoses from coolant pipe at longitudinal member (right-side) and detach coolant pipe.

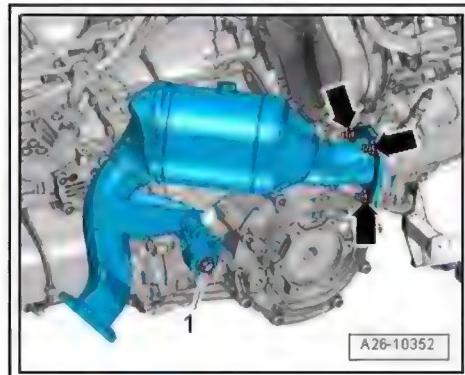


All vehicles (continued):

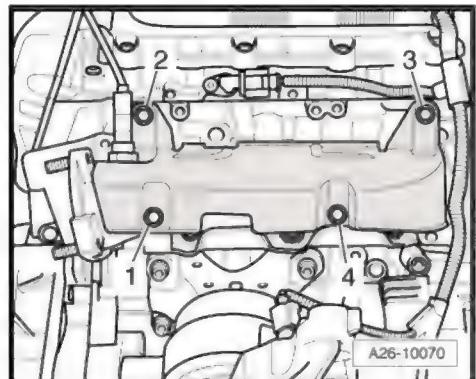
- Remove bolt -1- and nuts -arrows- and pull catalytic converter off exhaust manifold.



For illustration purposes, the installation position is shown with the engine removed.



- Remove bolts -1 ... 4- and detach heat shield.



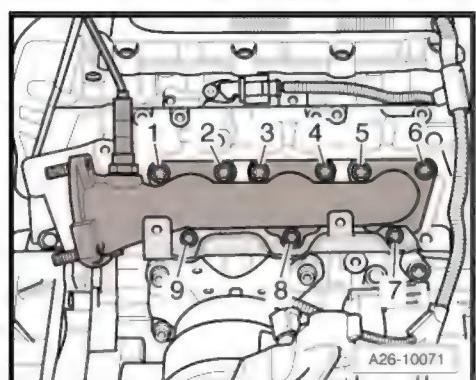
- Remove nuts -7- and -9- and detach bracket for heat shield.
- Remove nuts -1 ... 6- and -8- and detach exhaust manifold.

Installing

Installation is carried out in reverse order; note the following:

Note

- ◆ Renew gaskets and self-locking nuts.
- ◆ Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ *Electronic parts catalogue*.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue*.



- Fit exhaust manifold with gasket for catalytic converter and tighten nuts ⇒ [page 355](#).
- Install catalytic converter (right-side) ⇒ [page 337](#).
- Install Lambda probe - G39- ⇒ [page 319](#).
- Install air cleaner housing ⇒ [page 295](#).

Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 207](#).

Tightening torques

- ◆ ⇒ Fig. "Exhaust manifold (right-side) - tightening torque and sequence", [page 355](#)
- ◆ ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view + drive shaft
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Exploded view - heat shield
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ◆ ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

28 – Ignition system

1 Ignition system

- ⇒ “1.1 Exploded view - ignition system”, page 362
- ⇒ “1.2 Test data - spark plugs”, page 363
- ⇒ “1.3 Removing and installing ignition coils with output stages”, page 363
- ⇒ “1.4 Removing and installing knock sensor”, page 365
- ⇒ “1.5 Removing and installing Hall senders”, page 366
- ⇒ “1.6 Removing and installing engine speed sender G28”, page 367

1.1 Exploded view - ignition system

1 - Bolt

- 9 Nm

2 - Hall sender - G40-

- Removing and installing
⇒ “1.5 Removing and installing Hall senders”, page 366

3 - O-ring

- Renew

4 - Knock sensor

- Cylinder bank 1 (right-side): knock sensor 1 - G61-
- Cylinder bank 2 (left-side): knock sensor 2 - G66-
- Removing and installing
⇒ “1.4 Removing and installing knock sensor”, page 365

5 - Bolt

- 20 Nm

6 - Spark plug

- Change interval ⇒ Maintenance tables
- Tightening torque ⇒ Maintenance ; Booklet 411

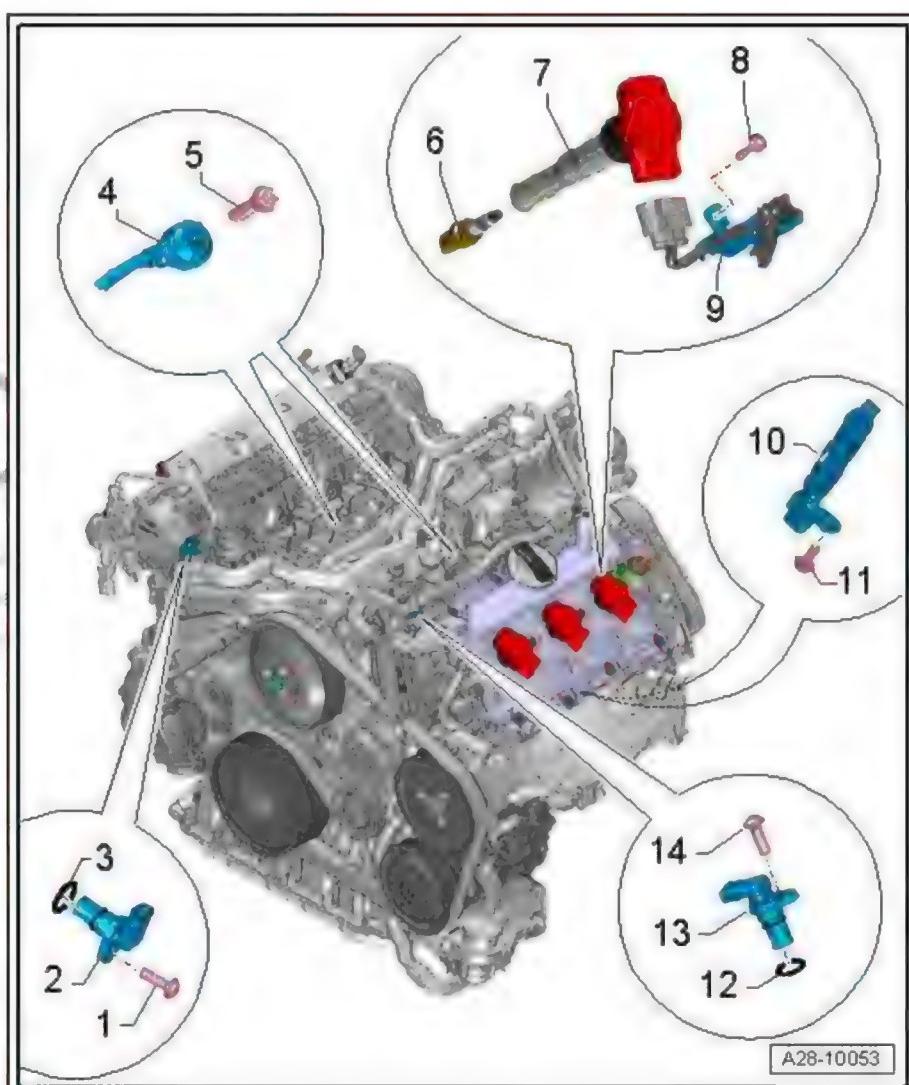
7 - Ignition coil

- Removing and installing
⇒ “1.3 Removing and installing ignition coils with output stages”, page 363

8 - Bolt

- 5 Nm

9 - Electrical wiring harness



10 - Engine speed sender - G28-

- Removing and installing ⇒ [“1.6 Removing and installing engine speed sender G28”, page 367](#)

11 - Bolt

- 9 Nm

12 - O-ring

- Renew

13 - Hall sender 2 - G163-

- Removing and installing ⇒ [“1.5 Removing and installing Hall senders”, page 366](#)

14 - Bolt

- 9 Nm

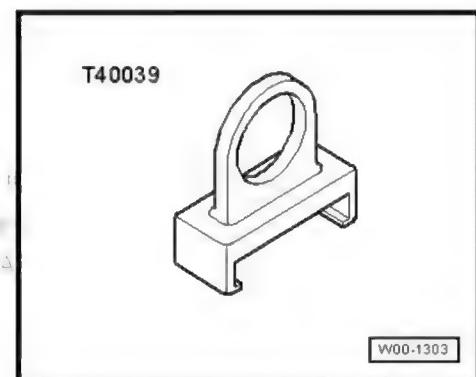
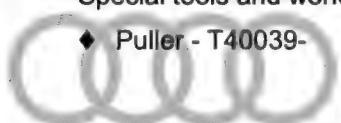
1.2 Test data - spark plugs

3.0 ltr. TFSI engine		
Idling speed		Cannot be adjusted; regulated by idling speed stabilisation
Ignition timing		Not adjustable (determined by control unit)
Ignition system		Multi-coil system with 6 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Spark plugs	Designations	⇒ Electronic parts catalogue
	Tightening torque	⇒ Maintenance ; Booklet 411
Firing order		1-4-3-6-2-5

1.3 Removing and installing ignition coils with output stages

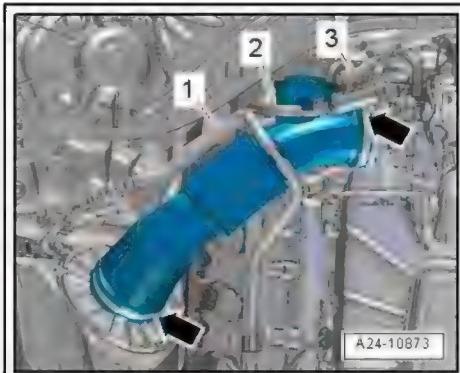
Special tools and workshop equipment required

- ◆ Puller - T40039-



Cylinder bank 1 (right-side):

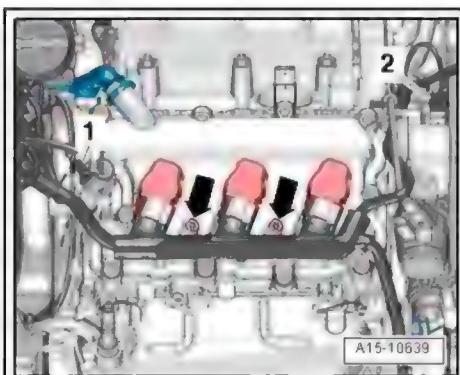
- Remove engine cover panel (rear) [page 67](#).
- Move fuel line -1- and line -2- from activated charcoal filter clear at air cleaner housing and air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Loosen hose clips -arrows- and detach air pipe.



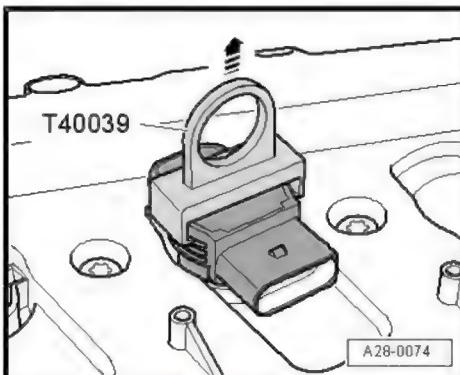
- Unscrew bolts -arrows- and unplug electrical connectors at ignition coils.
- Move electrical wiring harness down slightly.



Disregard items -1 and 2-

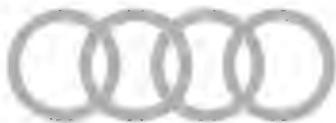


- Pull ignition coils out of spark plug holes using puller - T40039- .

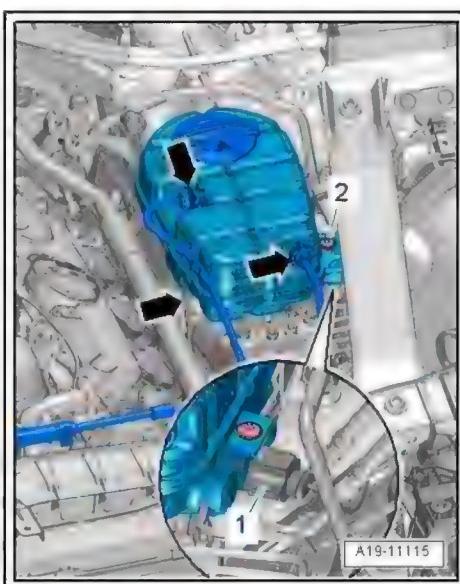


Cylinder bank 2 (left-side):

- Remove bolt -2-.
- Unplug electrical connector -1-.
- Push coolant expansion tank to one side with coolant hoses -arrows- attached.



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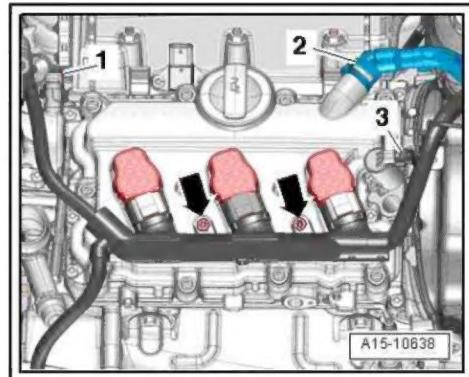


- Unscrew bolts -arrows- and unplug electrical connectors at ignition coils.
- Move electrical wiring harness down slightly.



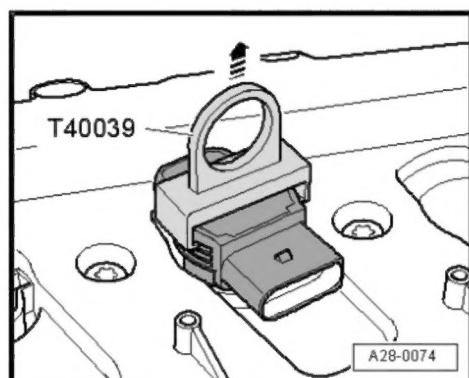
Note

Disregard -items 1, 2, 3-.



Both sides (continued):

- Pull out ignition coils with puller - T40039- -arrow-.



Installing

- Apply a thin bead of silicone paste all around end of sealing hose of ignition coil with output stage -arrow-.

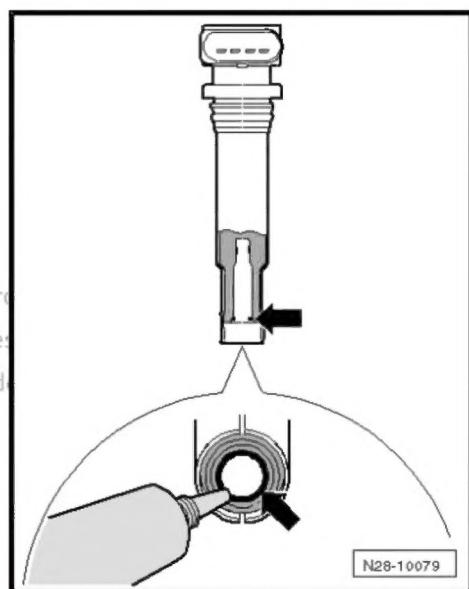
Silicone paste ⇒ Electronic parts catalogue (ETKA) .

- Fit all ignition coils loosely into spark plug holes.
- Align ignition coils with connectors and attach all connectors onto coils simultaneously.
- Push ignition coils evenly onto spark plugs by hand (do NOT attempt to knock in coils with any kind of tool).

The remaining installation steps are carried out in the reverse sequence.

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - ignition system”, page 362](#)



1.4 Removing and installing knock sensor

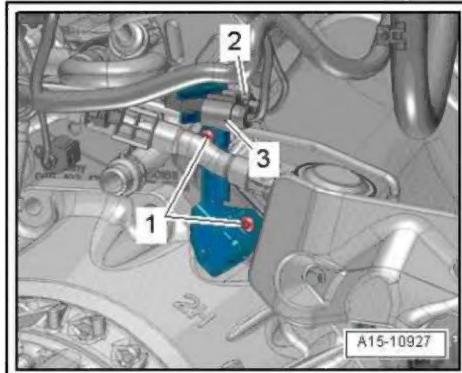
Removing

- Remove supercharger ⇒ [page 259](#) .
- Remove corresponding intake manifold (bottom section) ⇒ [page 300](#) .

- Take electrical connector -3- (cylinder bank 1) out of bracket.
- Remove electrical connector -2- for knock sensor 1 - G61- from bracket and unplug connector.



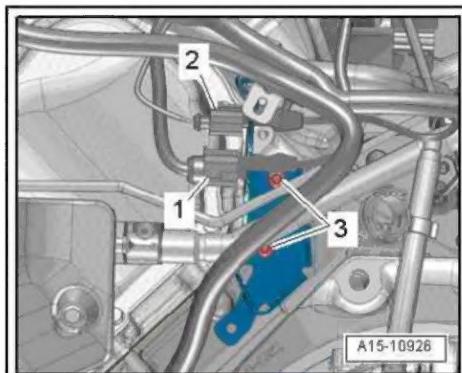
Disregard -item 1-.



- Take electrical connector -2- (cylinder bank 2) for knock sensor 2 - G66- out of bracket and unplug connector.



Disregard items -1 and 3-.



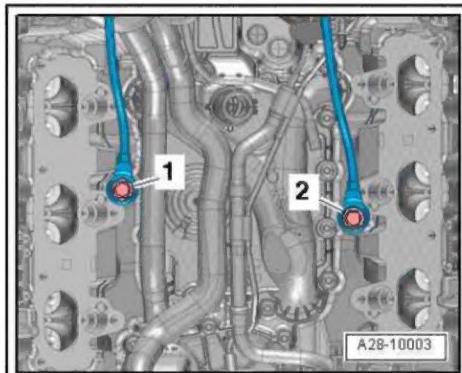
- Remove bolt -1- for knock sensor 1 - G61- or bolt -2- for knock sensor 2 - G66- and detach knock sensor.

Installing

- Re-install whichever knock sensor was removed.



The tightening torque influences the function of the knock sensor.



- Install intake manifold bottom section (left and right) [⇒ page 300](#).
- Install supercharger [⇒ page 259](#).

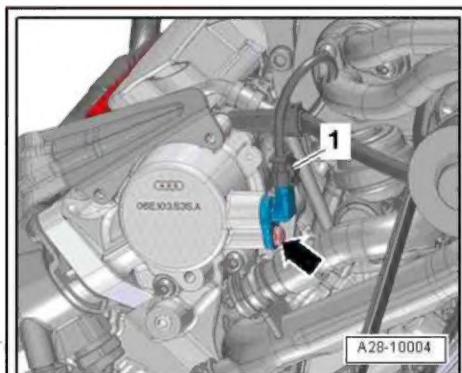
Tightening torques

- ◆ [⇒ "1.1 Exploded view - ignition system", page 362](#)

1.5 Removing and installing Hall senders

Removing

- Remove engine cover panel (front) [⇒ page 67](#).
- Unplug electrical connector -1- (cylinder bank 1).
- Unscrew bolt -arrow- and remove Hall sender - G40- .



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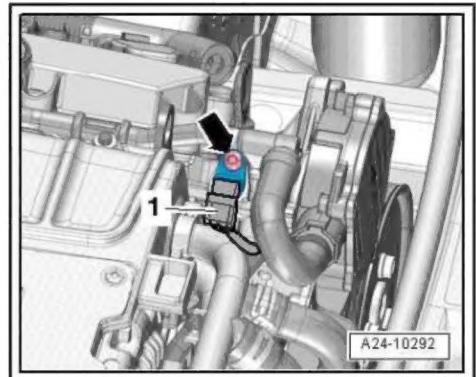
- Unplug electrical connector -1- (cylinder bank 2).
- Remove bolt -arrow- and detach Hall sender 2 - G163- .

Installing

- Renew O-ring and lubricate with clean engine oil.
- Carefully press in Hall sender by hand.
- Secure Hall sender and plug back connector.
- The remaining installation steps are carried out in the reverse sequence.

Tightening torques

◆ ⇒ “1.1 Exploded view - ignition system”, page 362



1.6 Removing and installing engine speed sender - G28-

Removing

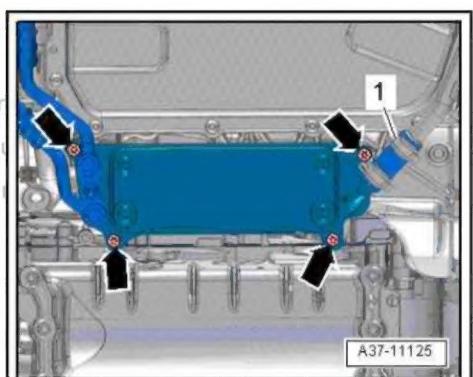
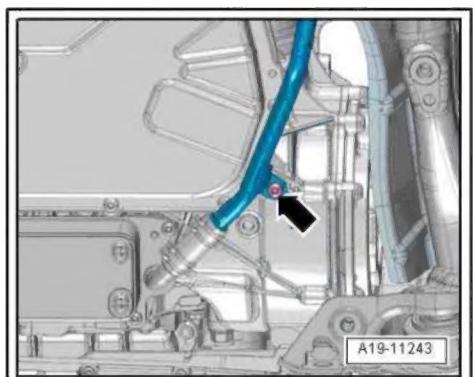
- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Remove bolt -arrow- for coolant pipe on gearbox (right-side).



- Remove bolts -arrows- and push ATF cooler slightly to one side.

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Disregard item 1- with respect to the correctness of information in this document.





- Unplug electrical connector -2-.
- Unscrew bolt -1- and pull out engine speed sender - G28- .

Installing

Installation is carried out in reverse order; note the following:

- Install ATF cooler ⇒ Rep. gr. 34 ; ATF circuit; Removing and installing ATF cooler with respect to the correctness of information in
- Install coolant pipe (right-side) on gearbox ⇒ [page 235](#) .

Tightening torques

- ◆ ⇒ “1.1 Exploded view - ignition system”, page 362
- ◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

